Stephen H. Schneider
Department of Biological Sciences
and
Center for Environmental Science and Policy
Stanford University

Probabilistic Assessment of "Dangerous" Climate Change

Second Annual Climate Change Research Conference
California Energy Commission
&
First Scientific Conference of West Coast Governors' Global Warming Initiative
Sacramento, California
14 September 2005

[for more details, see: http://stephenschneider.stanford.edu/]
{also: climatechange.net}

With Thanks to:

Michael Mastrandrea
[Stanford University]
&
Meghna Tare
[San Jose State University]
&
Amy Luers
[Union of Concerned Scientists]

Munich Re:
"We need to stop this dangerous experiment humankind is conducting on the Earth's atmosphere."

What does “dangerous” climate change really mean?

Article 2 of the UN Framework Convention on Climate Change (UNFCCC) states that: The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Framework Convention on Climate Change further suggests that "Such a level should be achieved within a time frame sufficient

- to allow ecosystems to adapt naturally to climate change,
- to ensure that food production is not threatened and
- to enable economic development to proceed in a sustainable manner."

“Dangerous” Climate Change

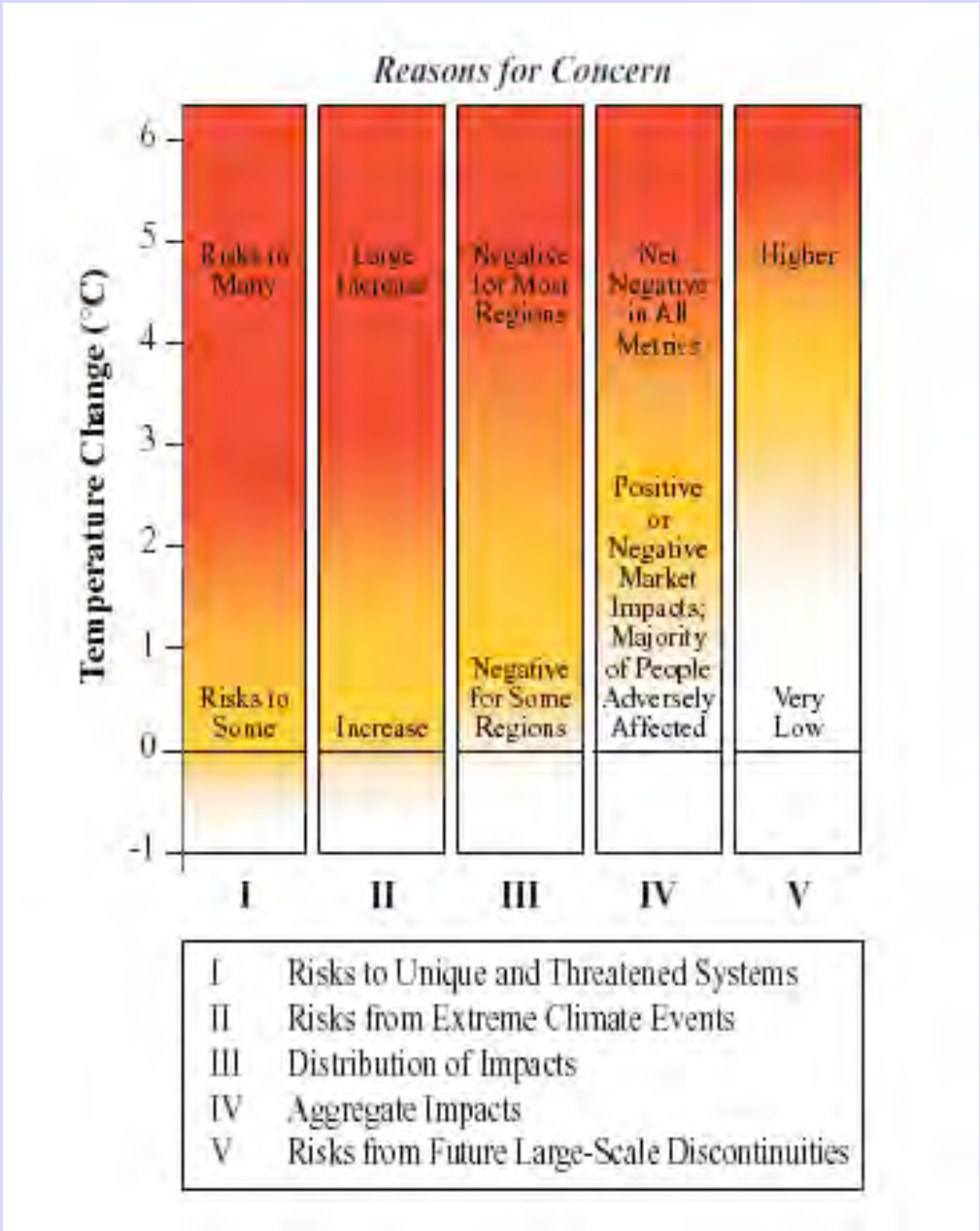
- Who decides what is “dangerous” in DAI?

“Dangerous” Climate Change

- Who decides what is “dangerous” in DAI?
- Many ways to define DAI

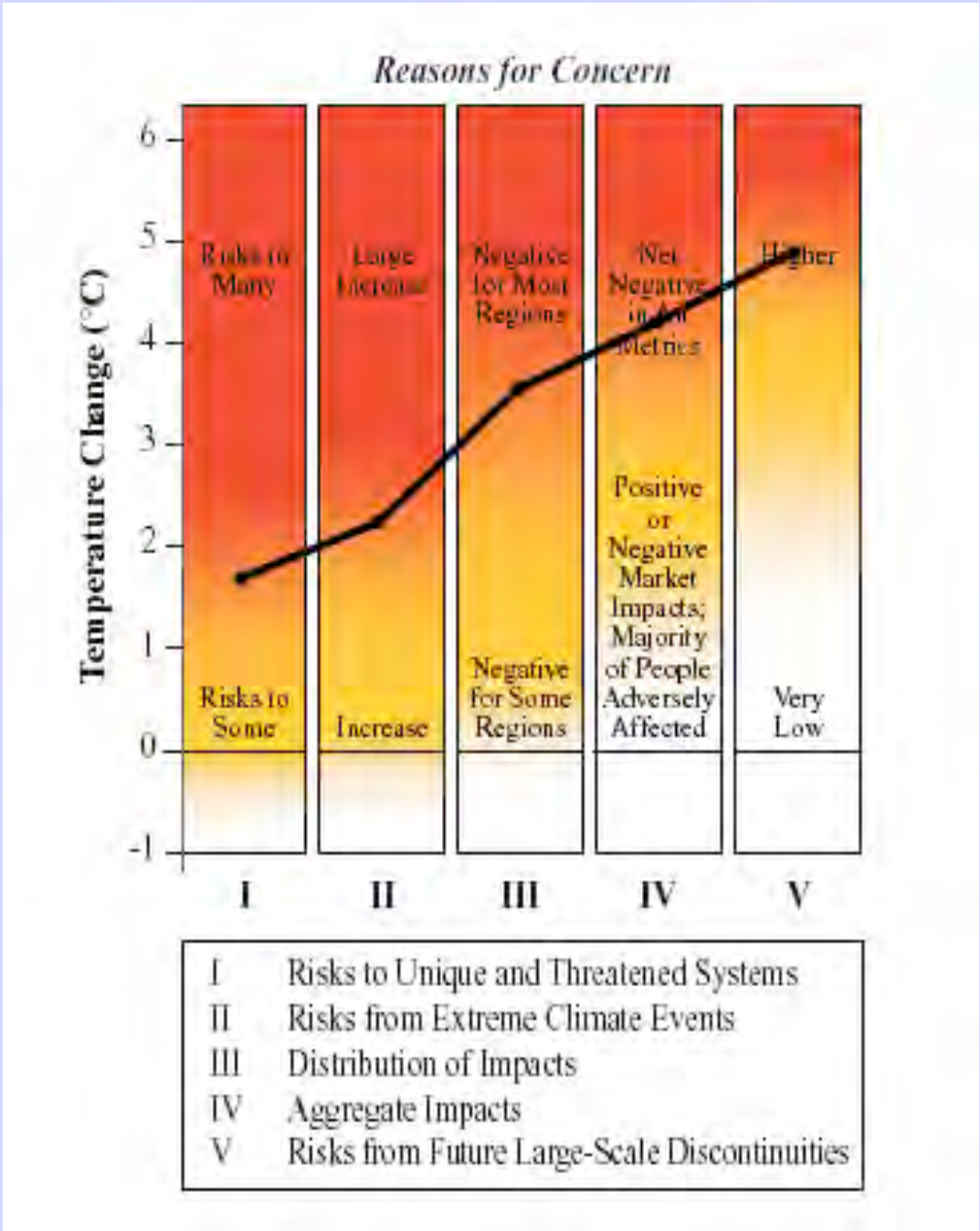
“Dangerous” Climate Change

- Who decides what is “dangerous” in DAI?
- Many ways to define DAI
- Ultimately, not a scientific choice



Reasons for Concern

(IPCC TAR, 2001)



"Dangerous" CDF

20th ‰: 1.8ºC
50th ‰: 2.85ºC
80th ‰: 4.2ºC

(IPCC TAR, 2001)

Climate Uncertainty

- Inherent uncertainty in projections of future climate

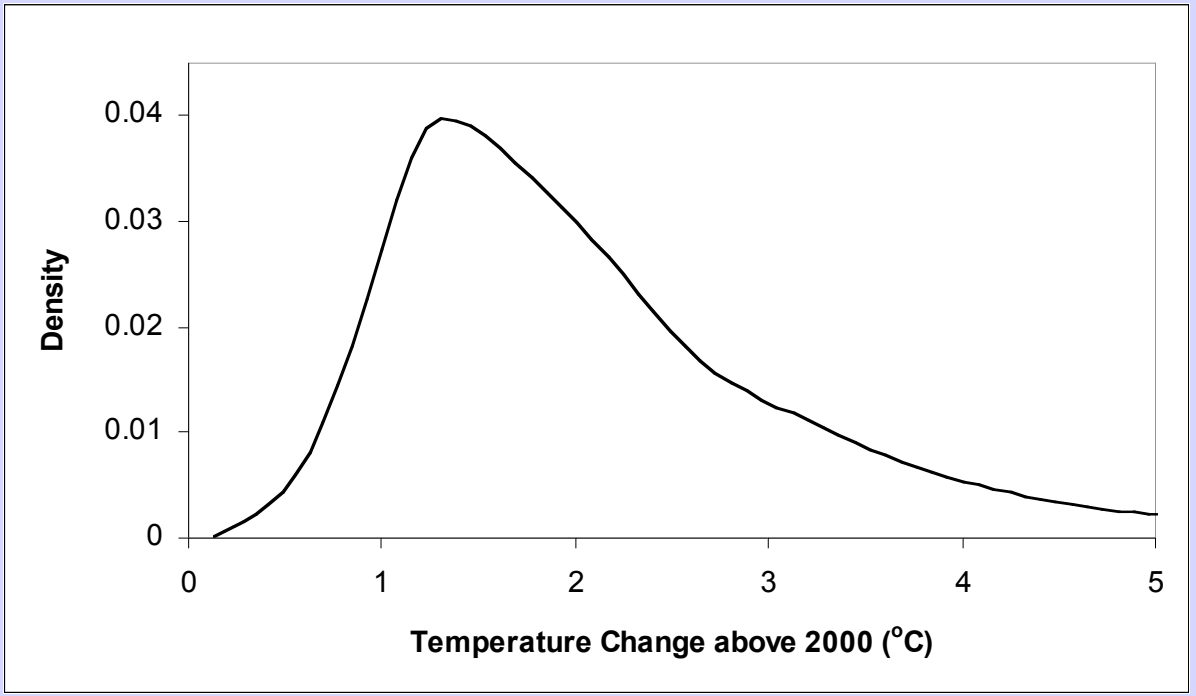
Climate Uncertainty

- Inherent uncertainty in projections of future climate

- Best guess → Range → PDFs

Climate Uncertainty

Climate Uncertainty



Climate Uncertainty

- Inherent uncertainty in projections of future climate
- Best guess → Range → PDFs
- Climate policy → risk management

Climate Policy Analysis

- Assess risk as a function of policy choices

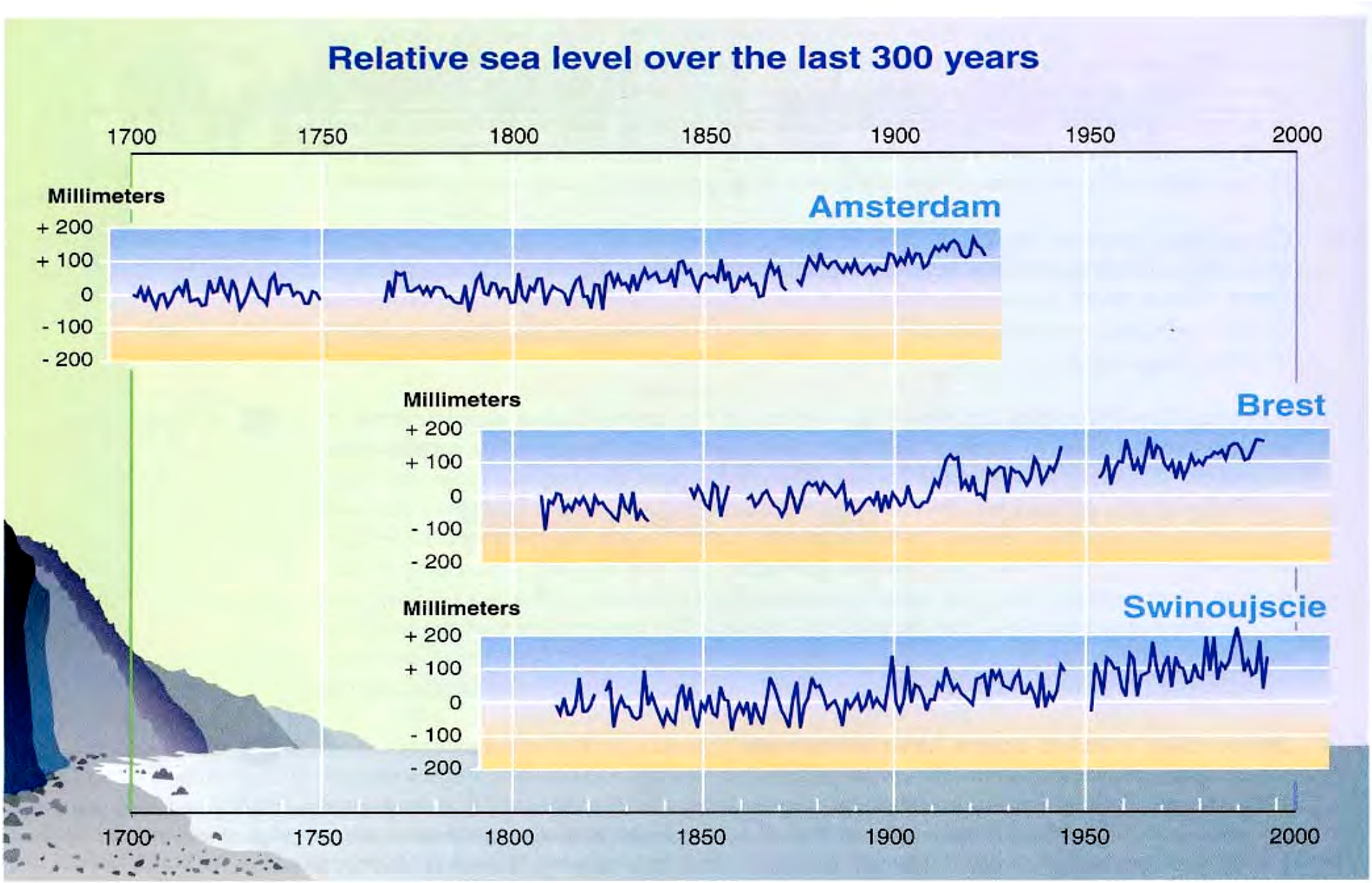
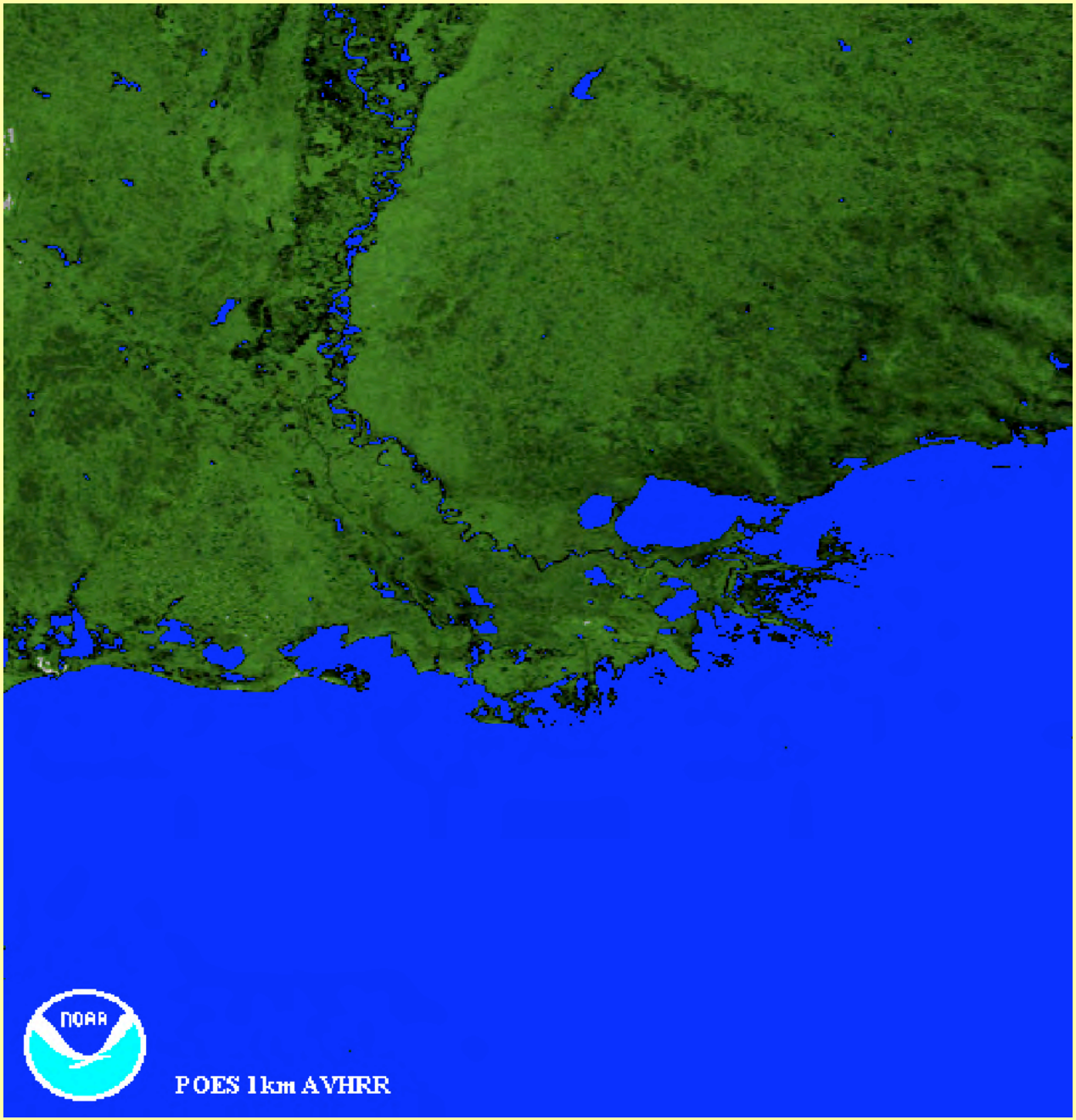
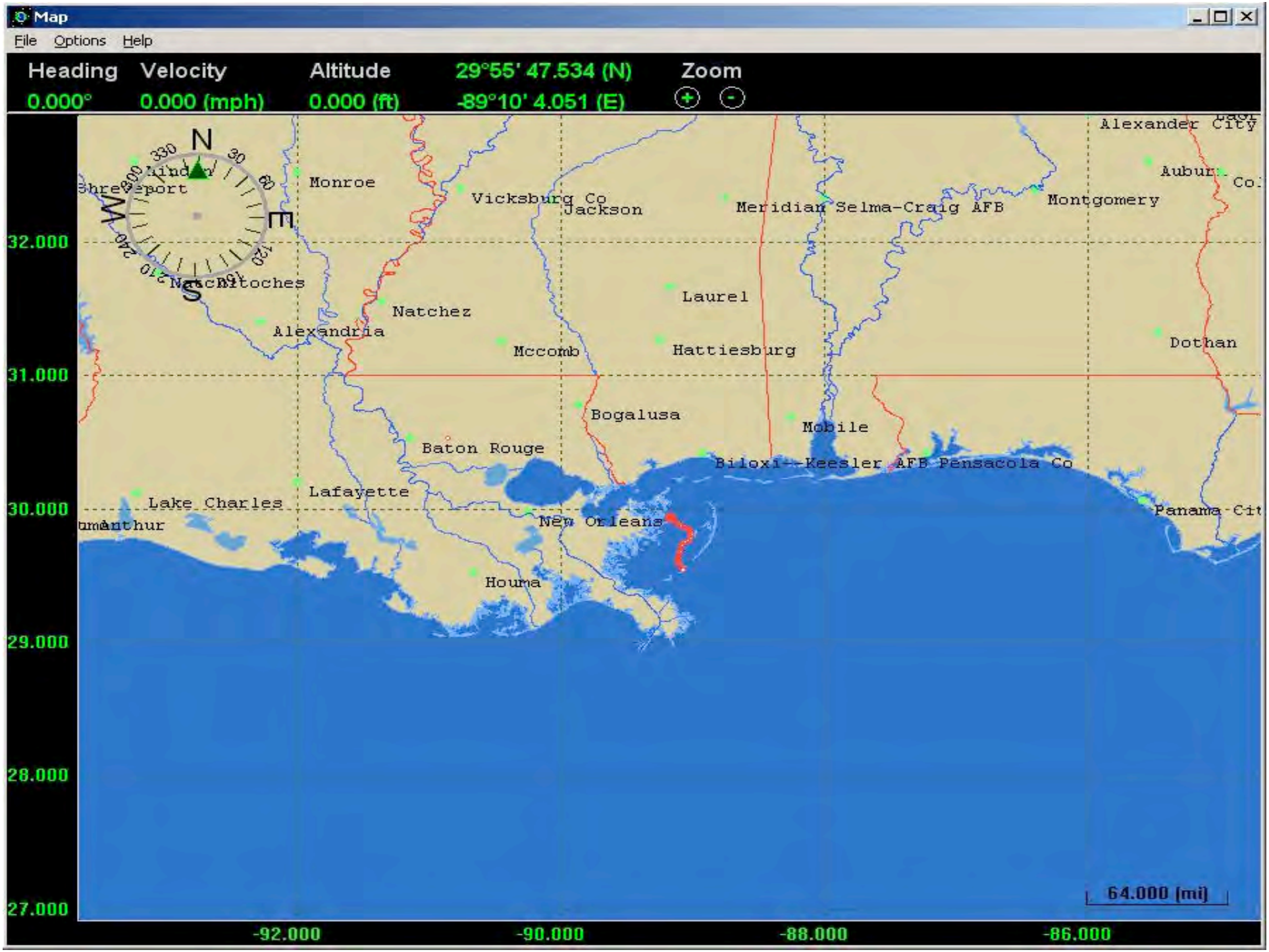


Figure 2-5: A limited number of sites in Europe have nearly continuous records of sea level spanning 300 years and show the greatest rise in sea level over the 20th century. Records shown from Amsterdam, The Netherlands, Brest, France, and Swinoujscie, Poland, as well as other sites, confirm the accelerated rise in sea level over the 20th century as compared to the 19th.

WGI TAR Figure 11-7


NOAA
POES 1km AVHRR


Map
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Heading
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-89°10' 4.051 (E)
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Vicksburg Co
Jackson
Meridian
Selma-Craig AFB
Montgomery
Alexander City
Auburn
Natchez
Alexandria
Laurel
Mccomb
Hattiesburg
Dothan
Bogalusa
Mobile
Baton Rouge
Biloxi--Keesler AFB
Pensacola Co
Lafayette
Lake Charles
New Orleans
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-88.000
-86.000
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Hammond
Covington
Slidell
LaPlace
MSY
New Orleans
Metaire
Kenner
Harahan
Chalmette
Gretna
Harvey
Joyce Wildlife Area
Manchac Wildlife Area
Lake Maurepas
Lake Pontchartrain
Lake Pontchartrain Causeway (TOLL)
Lake Borgne
French Quarter
down town
Convention Center
Superdome
©2001 MHPCo
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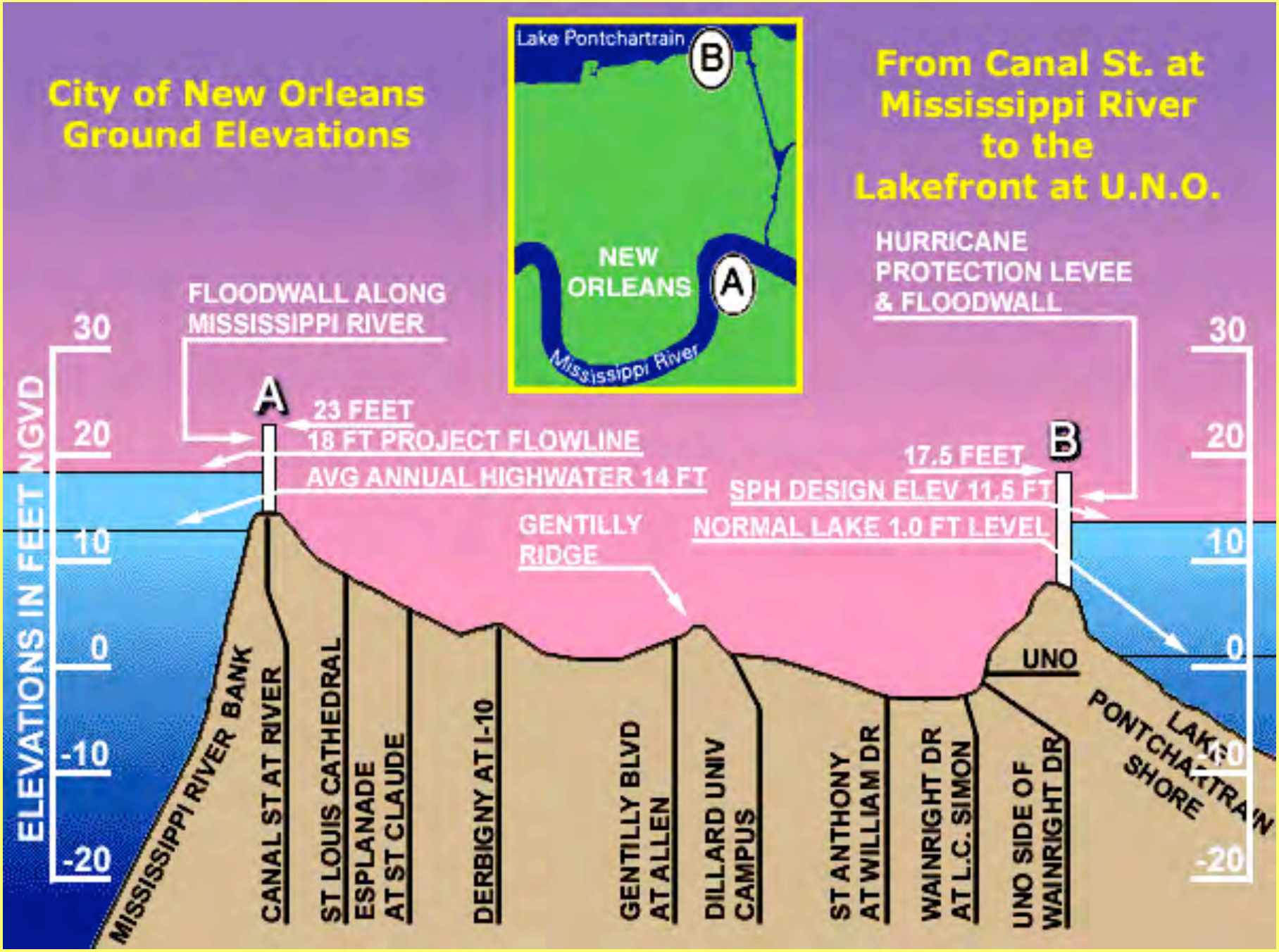
City of New Orleans
Ground Elevations
From Canal St. at
Mississippi River
to the
Lakefront at U.N.O.
Lake Pontchartrain
B
NEW
ORLEANS
A
Mississippi River
FLOODWALL ALONG
MISSISSIPPI RIVER
HURRICANE
PROTECTION LEVEE
& FLOODWALL
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18 FT PROJECT FLOWLINE
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NORMAL LAKE 1.0 FT LEVEL
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RIDGE
MISSISSIPPI RIVER BANK
CANAL ST AT RIVER
ST LOUIS CATHEDRAL
ESPLANADE
AT ST CLAUDE
DERBIGNY AT I-10
GENTILLY BLVD
AT ALLEN
DILLARD UNIV
CAMPUS
ST ANTHONY
AT WILLIAM DR
WAINRIGHT DR
AT L.C. SIMON
UNO SIDE OF
WAINRIGHT DR
UNO
LAKE PONTCHARTRAIN
SHORE

Adaptive Capacity?

-For New Orleans for greater than category 3 tropical cyclones: very low adaptive capacity

-Vulnerability is emergent property of coupled socio-natural system, influenced by risk-management decisions as well as environmental hazards

nature Vol 436|4 August 2005|doi:10.1038/nature03906

LETTERS

Increasing destructiveness of tropical cyclones over the past 30 years

Kerry Emanuel[1]

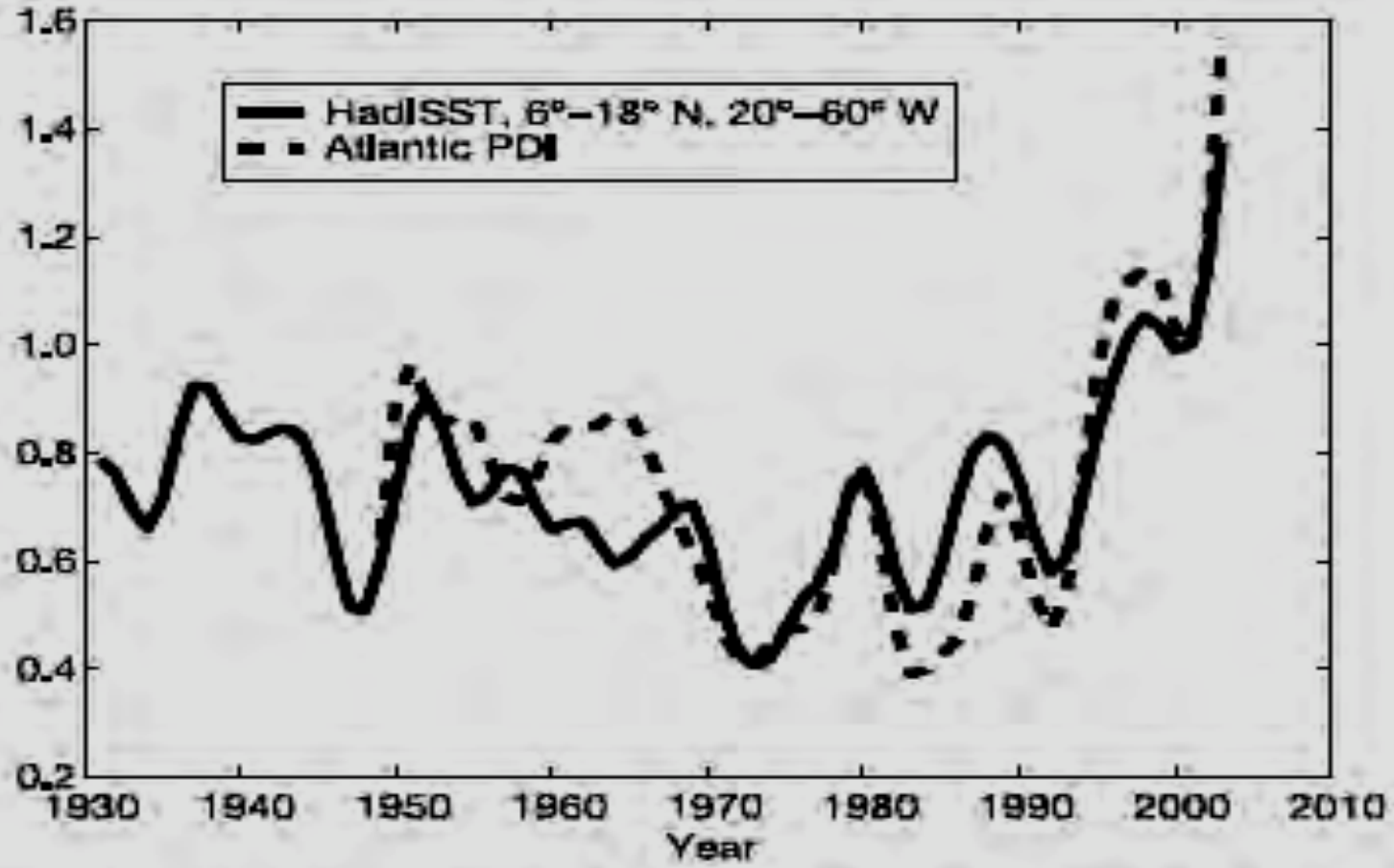


Figure 1 | A measure of the total power dissipated annually by tropical cyclones in the North Atlantic (the power dissipation index, PDI) compared to September sea surface temperature (SST). The PDI has been multiplied by 2.1×10^{-12} and the SST, obtained from the Hadley Centre Sea Ice and SST data set (HadISST)[22], is averaged over a box bounded in latitude by 6° N and 18° N, and in longitude by 20° W and 60° W. Both quantities have been smoothed twice using equation (3), and a constant offset has been added to the temperature data for ease of comparison. Note that total Atlantic hurricane power dissipation has more than doubled in the past 30 yr.

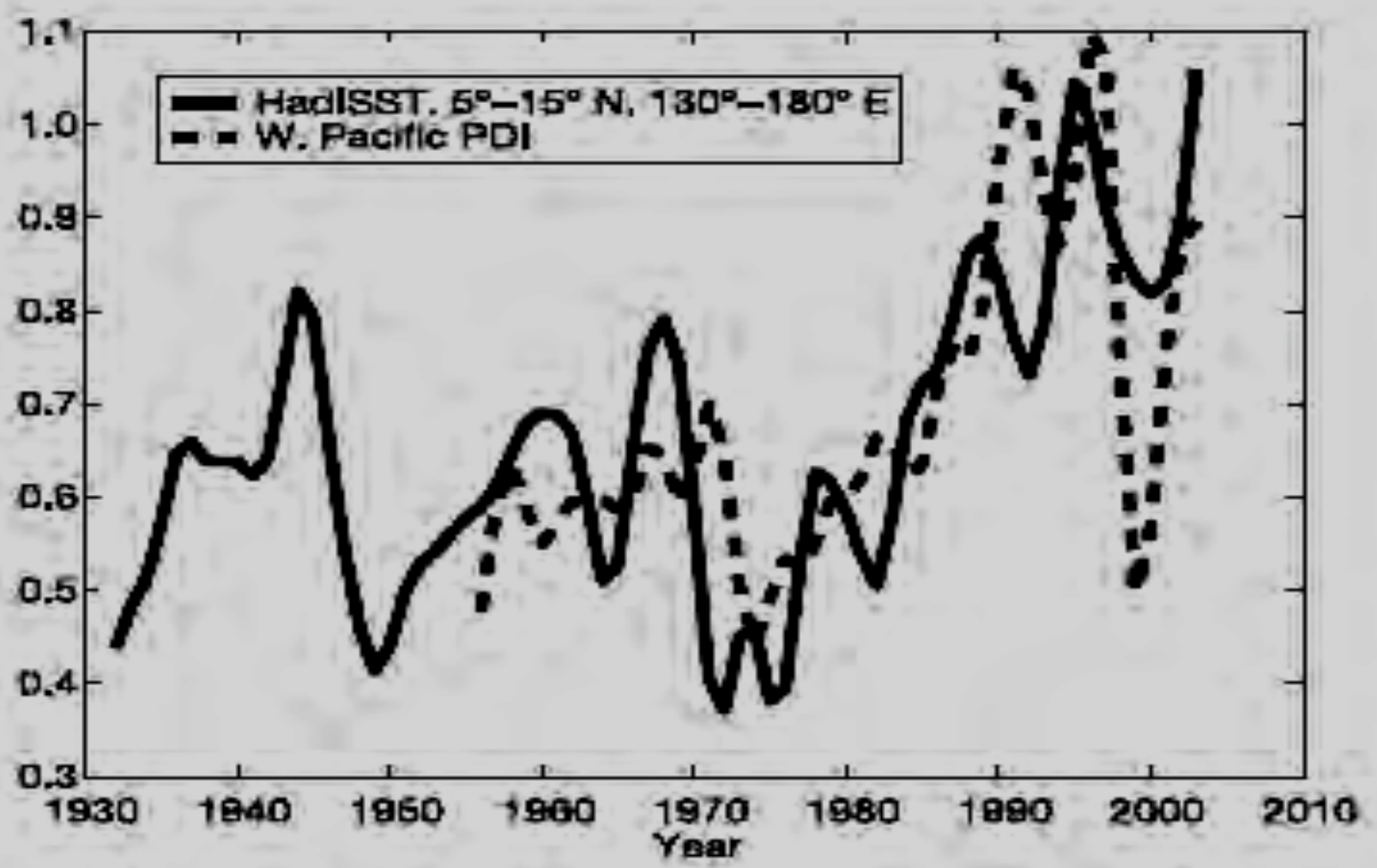


Figure 2 | Annually accumulated PDI for the western North Pacific, compared to July–November average SST. The PDI has been multiplied by a factor of 8.3×10^{-11} and the HadISST (with a constant offset) is averaged over a box bounded in latitude by 5° N and 15° N, and in longitude by 130° E and 180° E. Both quantities have been smoothed twice using equation (3). Power dissipation by western North Pacific tropical cyclones has increased by about 75% in the past 30 yr.

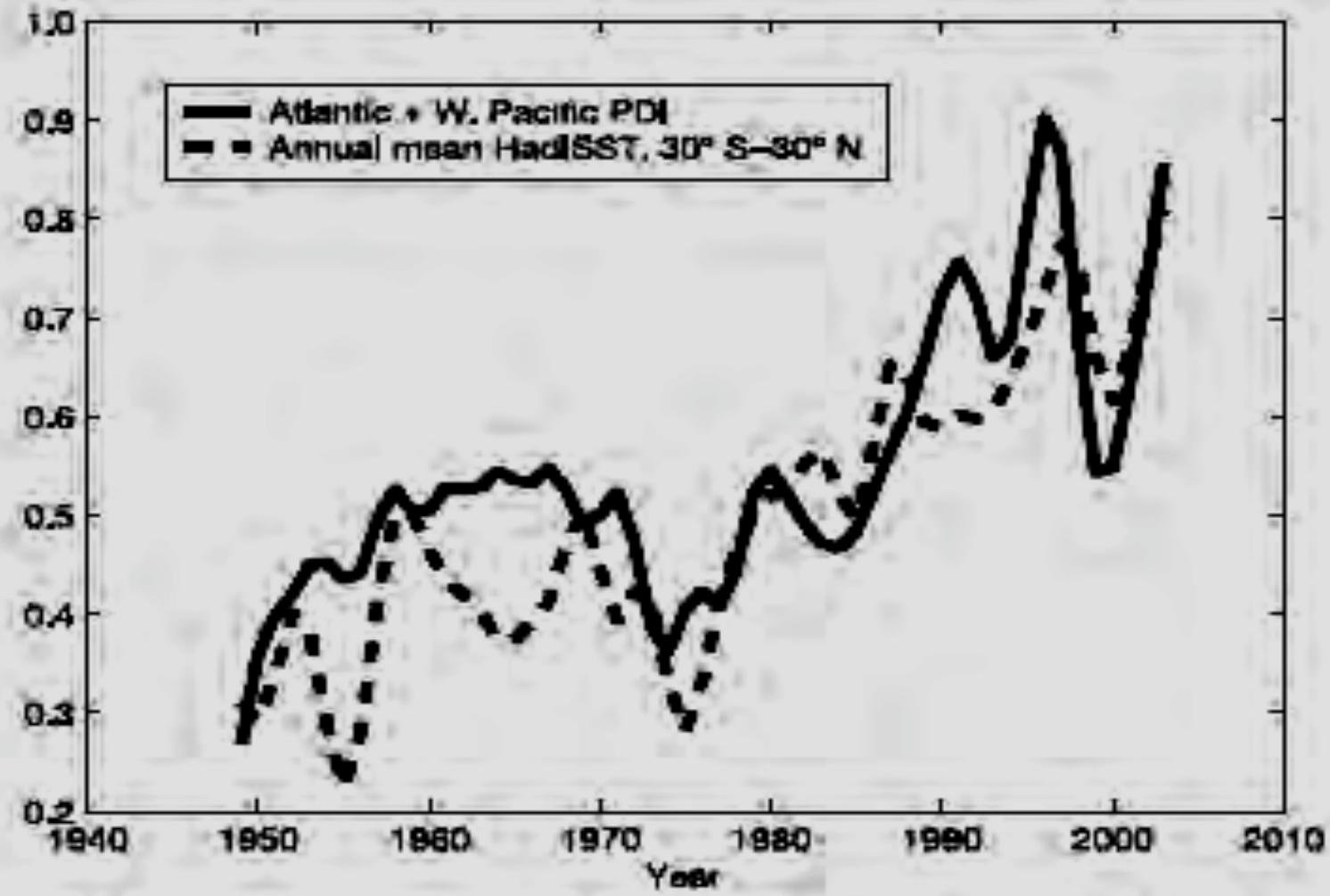


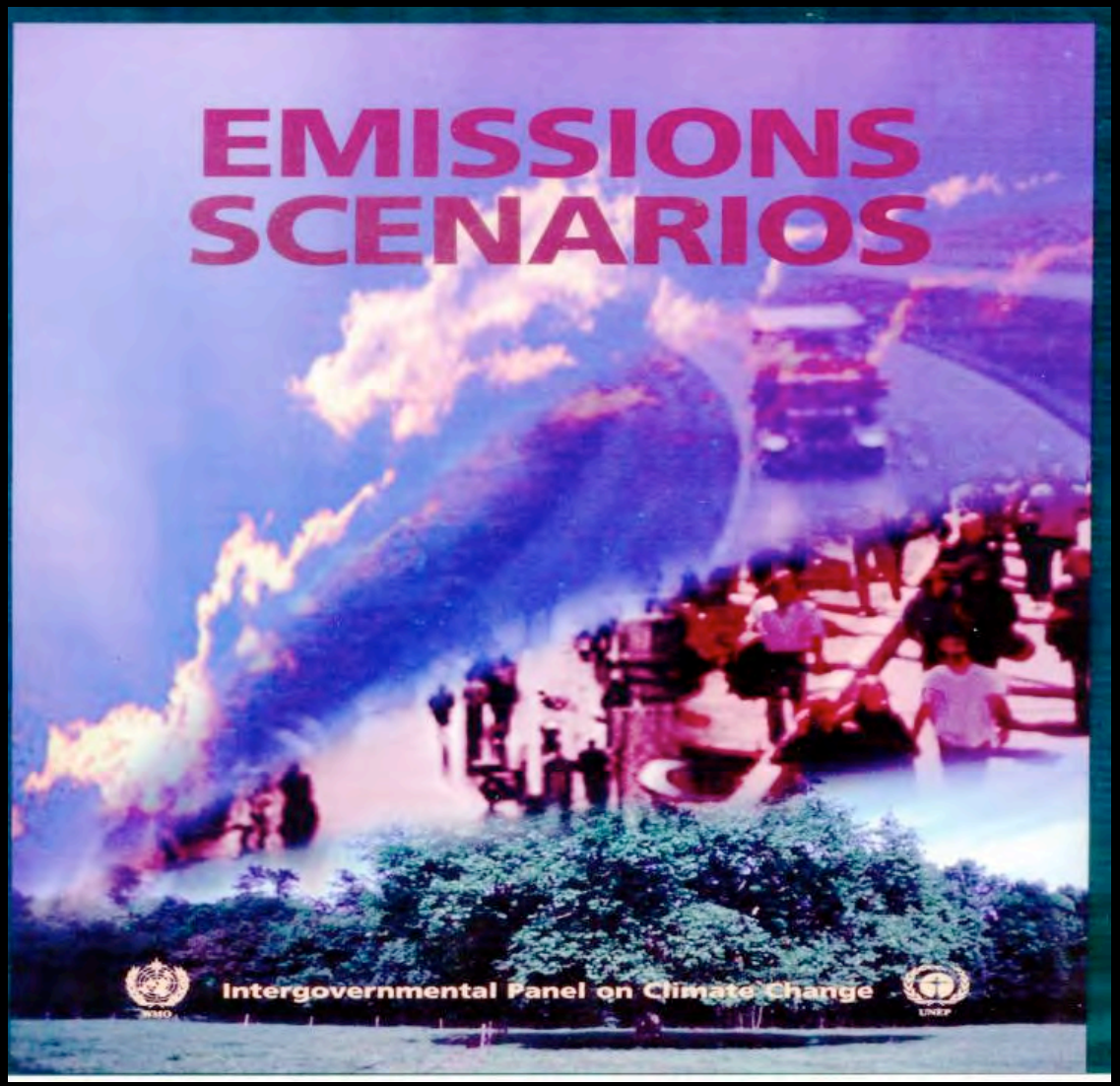
Figure 3 | Annually accumulated PDI for the western North Pacific and North Atlantic, compared to annually averaged SST. The PDI has been multiplied by a factor of 5.8×10^{-13} and the HadISST (with a constant offset) is averaged between 30° S and 30° N. Both quantities have been smoothed twice using equation (3). This combined PDI has nearly doubled over the past 30 yr.

The above discussion suggests that only part of the observed increase in tropical cyclone power dissipation is directly due to increased SSTs; the rest can only be explained by changes in other factors known to influence hurricane intensity, such as vertical wind shear. Analysis of the 250–850 hPa wind shear from reanalysis data, over the same portion of the North Atlantic used to construct Fig. 1, indeed shows a downward trend of 0.3 $m\,s^{-1}$ per decade over the period 1949–2003, but most of this decrease occurred before 1970, and at any rate the decrease is too small to have had much effect. Tropical cyclone intensity also depends on the temperature distribution of the upper ocean, and there is some indication that sub-surface temperatures have also been increasing[21], thereby reducing the negative feedback from storm-induced mixing.

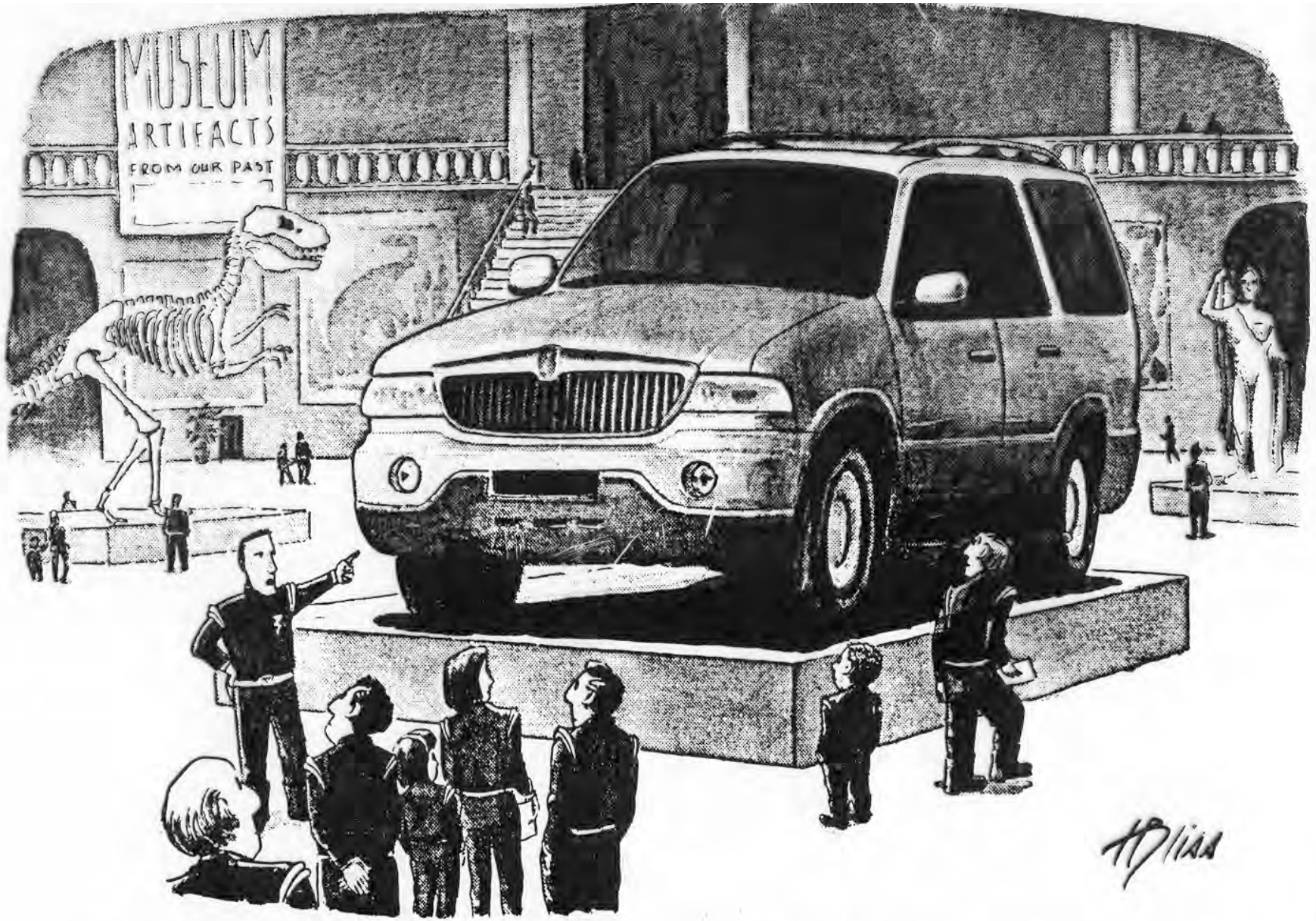
Whatever the cause, the near doubling of power dissipation over the period of record should be a matter of some concern, as it is a measure of the destructive potential of tropical cyclones. Moreover, if

The role of the scientific community

#1: Provide climate change scenarios



The IPCC's Special Report on Emissions Scenarios (SRES) - 2000



"We're not certain why they disappeared, but archeologists speculate that it may have had something to do with their size."

Large Vehicles Are the Solution, Not the Problem

By Sam Kazman

If you listen to journalists, you'd think sport-utility vehicles were more dangerous than Saddam Hussein. SUVs supposedly deplete the Earth's resources, poison its atmosphere and encourage rude driving. Worst of all, because of their size they allegedly pose a grave collision threat to just about anyone who ventures outdoors. According to a recent New York Times report, the worst safety hazard is yet to come—once these "expensive toys" depreciate and are sold by the "responsible family people" who now drive them, they'll be bought by teenagers who'll handle them even more recklessly.

These threats have been wildly overstated. And the solution proposed by many SUV critics, raising the federal fuel economy standards, would mean expanding a regulatory program that has already caused thousands of traffic deaths.

The federal Corporate Average Fuel Economy standards, enacted in the wake of the mid-1970s oil shocks, require each auto maker's annual output of new cars to meet a set fuel economy level. The current passenger-car CAFE standard is 27.5 miles per gallon; for light trucks, the standard is a more lenient 20.7 mpg.

The easiest way for car makers to meet ever-rising CAFE standards has been through continued car downsizing. As the National Highway Traffic Safety Administration itself noted, "weight reduction is probably the most powerful technique for improving fuel economy. . . . Each 10 percent reduction in weight improves the fuel economy of a new vehicle design by approximately 8 percent." The result was a CAFE-driven downsizing of approximately 500 pounds per car.

Smaller cars, however, are less crashworthy than similarly equipped large cars in practically every type of accident. According to a 1989 Harvard-Brookings study, CAFE-induced downsizing has increased car occupant fatalities by between 14% and 27%; that translates to between 2,000 and 4,000 extra deaths a year.

You'd think that NHTSA, an agency whose middle name is safety, would have brought this issue to the forefront of public attention. But instead NHTSA has repeatedly claimed that CAFE has no safety effect. In a 1992 court case brought by the Competitive Enterprise Institute and Consumer Alert, a panel of federal appeals judges blasted NHTSA's position as "fudged analysis," "statistical legerdemain" and "bureaucratic mumbo-jumbo."

You're safer in a sport utility vehicle.

If CAFE had been a privately produced product, it would long ago have been recalled as defective and its producer, NHTSA, jailed for the coverup. But because CAFE is a product of Washington rather than Detroit, it remains in place; worse yet, it threatens to expand in the face of the SUV "threat."

The overblown nature of that threat is demonstrated by a study issued last month by the Insurance Institute for Highway Safety. Journalists widely reported the study as re-emphasizing the need for action against SUVs, but its findings indicate otherwise. What the institute found was that collisions between cars and SUVs account for only 4% of car occupant fatalities.

Cars are most vulnerable in side impact collisions. According to the institute, in fatal collisions involving cars that are hit on the side by SUVs, the relative risk that the death will be in the car rather than the SUV is an apparently lopsided 27-to-1. But when this relative risk is broken down by car weight categories, it turns out that car-SUV mismatches are frequently outweighed by other common collision disparities. For example, the occupants of a light car struck in the side by a heavy car face a greater relative risk of death than when a heavy car is side-impacted by an SUV. That is, there is a greater mismatch between light cars and heavy cars than there is between heavy cars and SUVs.

What this means is that upsizing the car fleet may well be the most important step we could take toward improving safety. But upsizing, of course, is what CAFE currently restricts.

The same conclusion emerges from a 1997 NHTSA study, which was similarly characterized as indicting SUVs but which turns out, on closer analysis, to indict CAFE. A NHTSA press release touted the study's finding that a 100-pound decrease in SUV weight would prevent 40 fatalities per year, most of them in cars colliding with SUVs. But according to the study itself, this conclusion was not statistically significant; there might even be a net loss of life from such downsizing, and on balance the overall effect would be "negligible." More important, those minimal effects paled in comparison to the effects of a 100-pound *increase* in passenger car weight—a saving of over 300 lives a year. And the effect of this passenger car upsizing was found to be statistically significant, unlike the SUV downsizing.

Upsizing, however, would entail relaxing CAFE rather than tightening it—a move that would be totally alien to this administration and to its environmentalist supporters. The Sierra Club, for example, claims that higher CAFE standards would be "the biggest single step to curbing global warming." In their 1992 campaign book, Bill Clinton and Al Gore recommended raising CAFE to 40 mpg by 2000—a level whose potential safety consequences add more than a little irony to the book's title, "Putting People First."

SUV critics argue, to use Consumer Reports' words, that "most people who buy an SUV don't need one." But what one person doesn't need is largely a matter of another person's opinion. In the early 1800s the Duke of Wellington complained that the new railroads would "only encourage the common people to move about needlessly." Today the elitist view is that the masses still move about needlessly, only now they're doing it with four-wheel drive.

SUV owners have perfectly good reasons for their vehicle choices. Even Consumer Reports praises their "roomy interiors, commanding view of the road, and go-anywhere ability." The fact that NHTSA has trained its sights on SUVs hasn't kept its administrator, Ricardo Martinez, out of one. He puts his family in a Ford Explorer, though he declares that he bought it for safety, to distinguish him self from "some teenager" trying "to b cool." Too bad his regulatory approac doesn't do much for other people's safety

In fact, much of the SUVs' recent popu larity stems from CAFE itself. CAFE's re strictions took their greatest toll on larg cars and station wagons. As economis Paul Godek pointed out in a study pul lished last fall, light trucks were the onl real alternative for consumers concerne about safety and seating capacity. In e fect, he concludes, most of the weigh forced off the passenger car fleet by CAF has reappeared in the light truck fleet.

So the real problem is CAFE, not SUVs The next time you hear the term SUV, re member: The "S" might as well stand fo scapegoat.

Mr. Kazman is general counsel of th Competitive Enterprise Institute in Was ington.

March 12, 1999

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“The Words of the prophets are written on the…?”


MELTING
DOES WELL AT THE POLES.
THE NEW H2.
HUMMER
LIKE NOTHING ELSE.
VIACOM


Anderson
SUPERSTORE
ANDERSON

Probabilistic assessment??

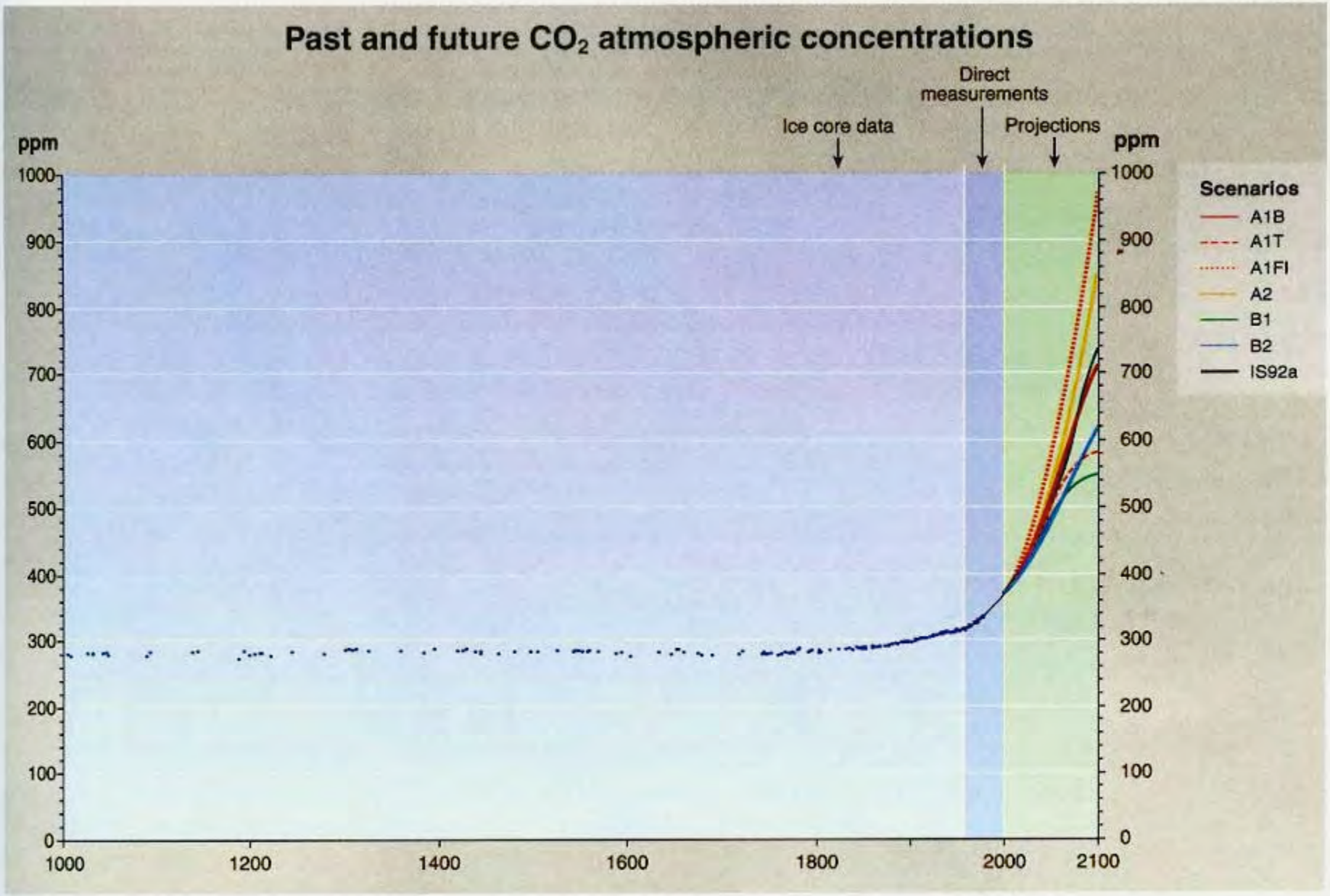


Figure SPM-10a: Atmospheric CO_2 concentration from year 1000 to year 2000 from ice core data and from direct atmospheric measurements over the past few decades. Projections of CO_2 concentrations for the period 2000 to 2100 are based on the six illustrative SRES scenarios and IS92a (for comparison with the SAR).

Q9 Figure 9-1a

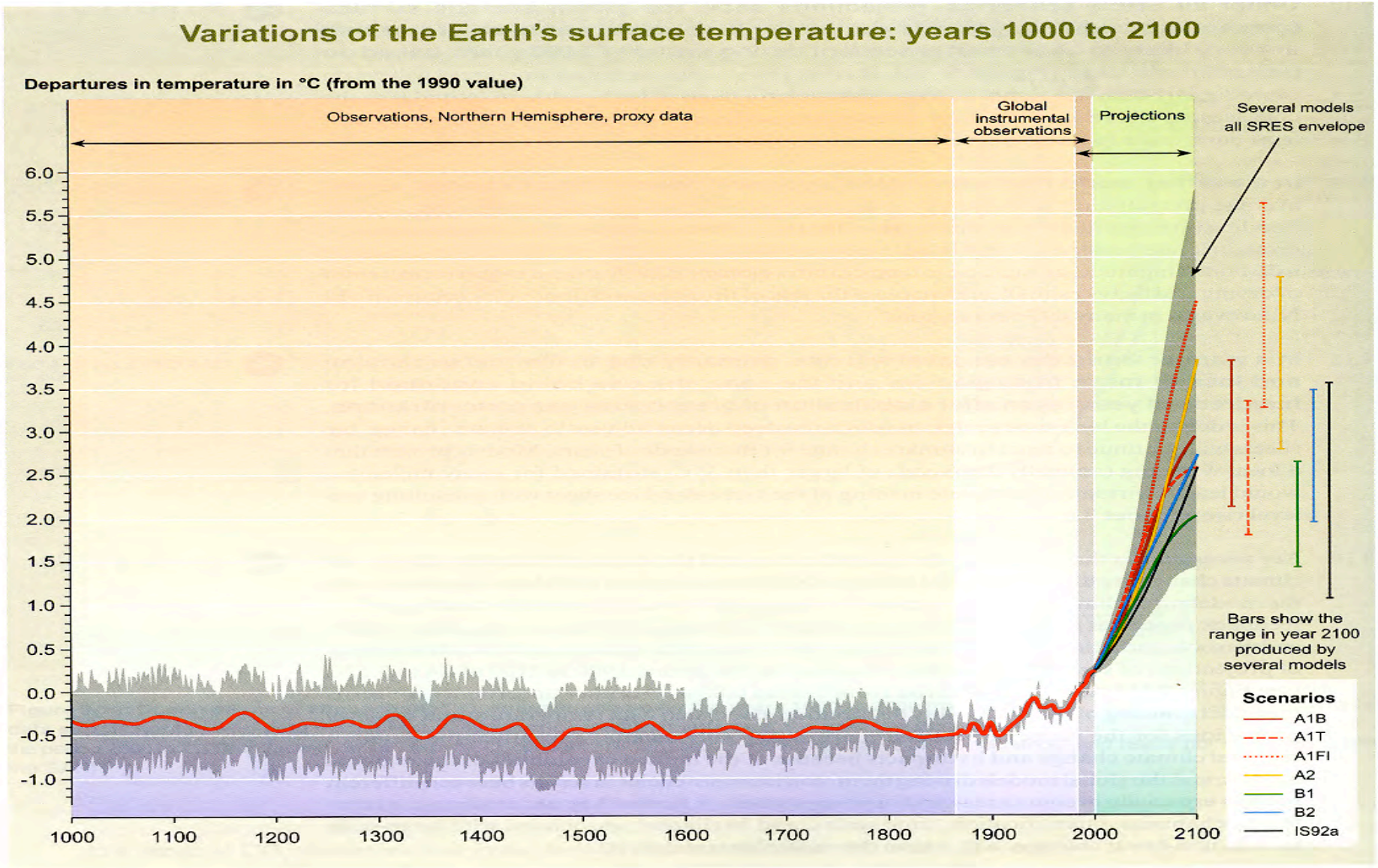


Figure 9-1b: Variations of the Earth's surface temperature: years 1000 to 2100. Over the period 1000 to 1860, observations are shown of variations in average surface temperature of the Northern Hemisphere (corresponding data from the Southern Hemisphere not available) constructed from proxy data (tree rings, corals, ice cores, and historical records). The line shows the 50-year average, and the grey region the 95% confidence limit in the annual data. From the years 1860 to 2000, observations are shown of variations of global and annual averaged surface temperature from the instrumental record. The line shows the decadal average. Over the period 2000 to 2100, projections are shown of globally averaged surface temperature for the six illustrative SRES scenarios and IS92a as estimated by a model with average climate sensitivity. The grey region "several models all SRES envelope" shows the range of results from the full range of 35 SRES scenarios in addition to those from a range of models with different climate sensitivities.

WGI TAR SPM Figures 1b & 5d

Risk = Probability x Consequence
[What metrics of harm?]

- -$/ton C avoided
- -lives lost/ton C avoided
- -species lost/ton C avoided
- -increased inequity/ton C avoided*
- -quality of life degraded/ton

*Perception that prime generators of the risks are not accepting responsibility for their emissions or helping victims to adapt (e.g., OECD countries refusing to join in Kyoto Protocol) itself creates risks.

[Source: "The Five Numeraires", Schneider, Kuntz-Duriseti and Azar 2000]

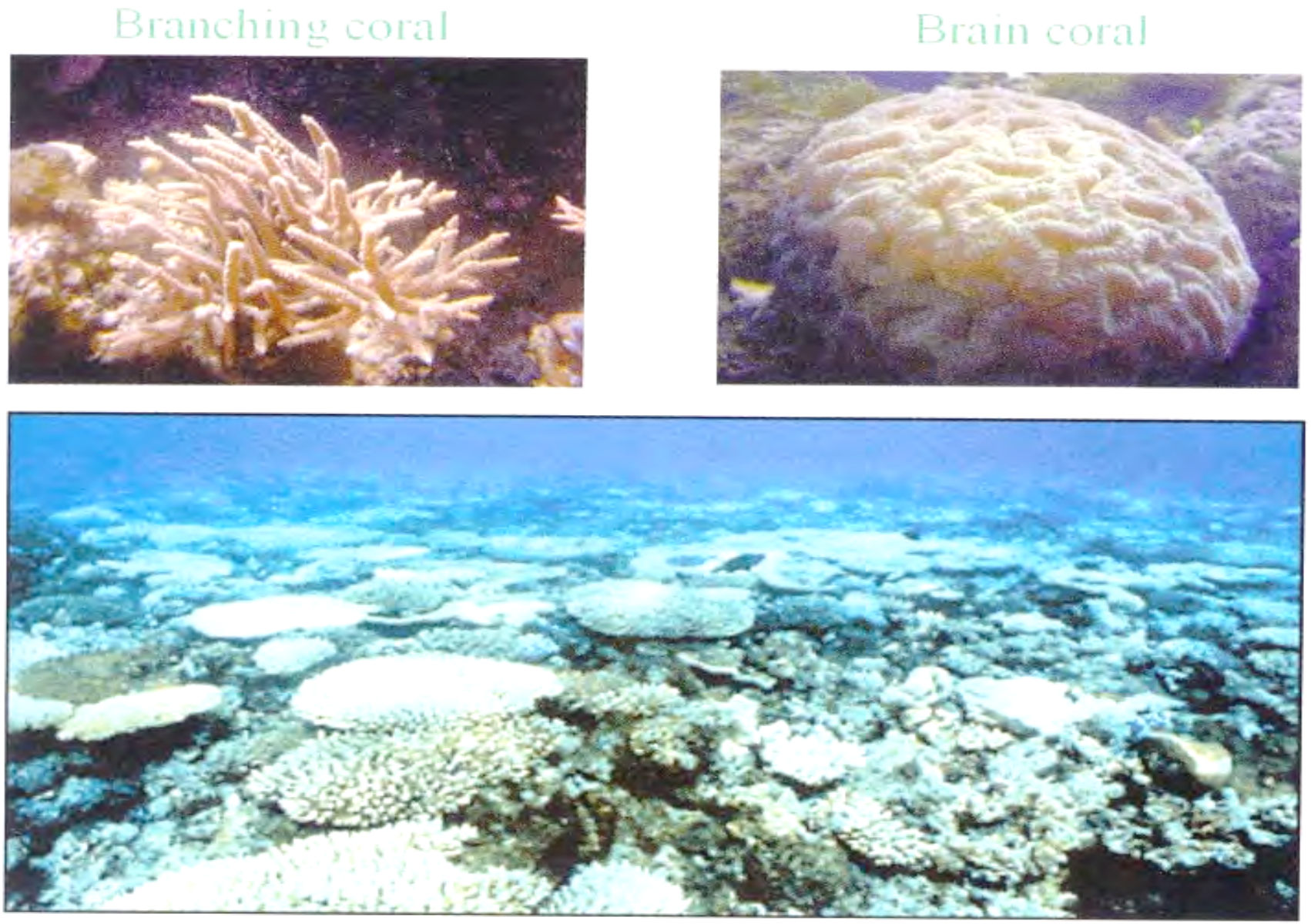
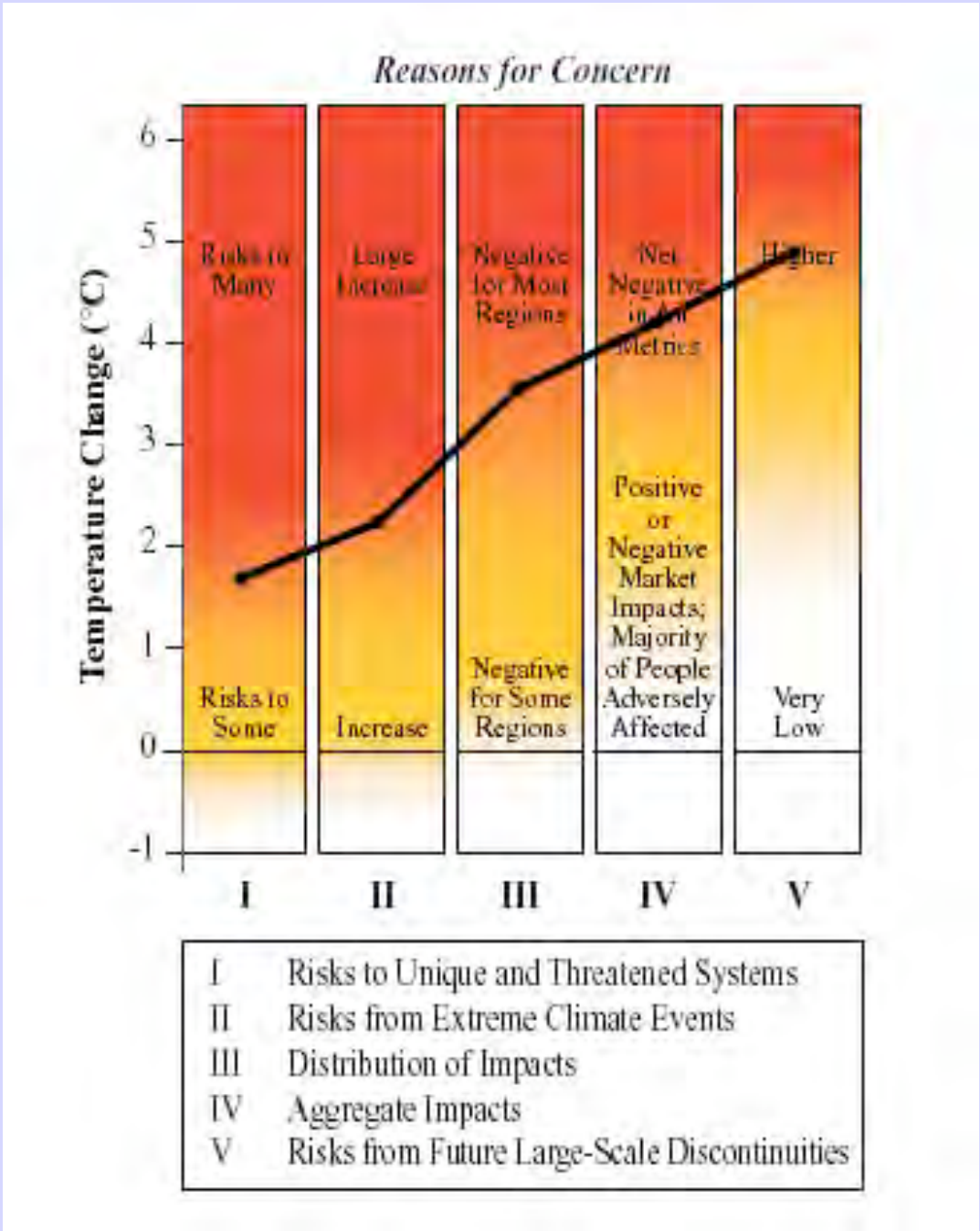


Figure 4-3: The diversity of corals could be affected with the branching corals (e.g., staghorn coral) decreasing or becoming locally extinct as they tend to be more severely affected by increases in sea surface temperatures, and the massive corals (e.g., brain corals) increasing.



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(IPCC TAR, 2001)

PAGE ONE

The Ukukus Wonder Why a Sacred Glacier Melts in Peru's Andes

It Could Portend World's End, So Mountain Worshipers Are Stewarding the Ice

By ANTONIO REGALADO
Staff Reporter of THE WALL STREET JOURNAL
June 17, 2005; Page A1

Vicente Revilla/BMCC-CUNY

An ukuku hauls a block of mountain ice near Cuzco, Peru, in 1999. The tradition is disappearing along with Peru's glaciers.

Inuit to file anti-U.S. climate petition
Wed Jun 15, 2005 11:09 AM

OSLO (Reuters) - Inuit hunters threatened by a melting of the Arctic ice plan to file a petition accusing Washington of violating their human rights by fueling global warming, an Inuit leader said Wednesday.

Sheila Watt-Cloutier, chair of the Inuit Circumpolar Conference (ICC), also said Washington was hindering work to follow up a 2004 report by 250 scientists that said the thaw could make the Arctic Ocean ice-free in summer by 2100.

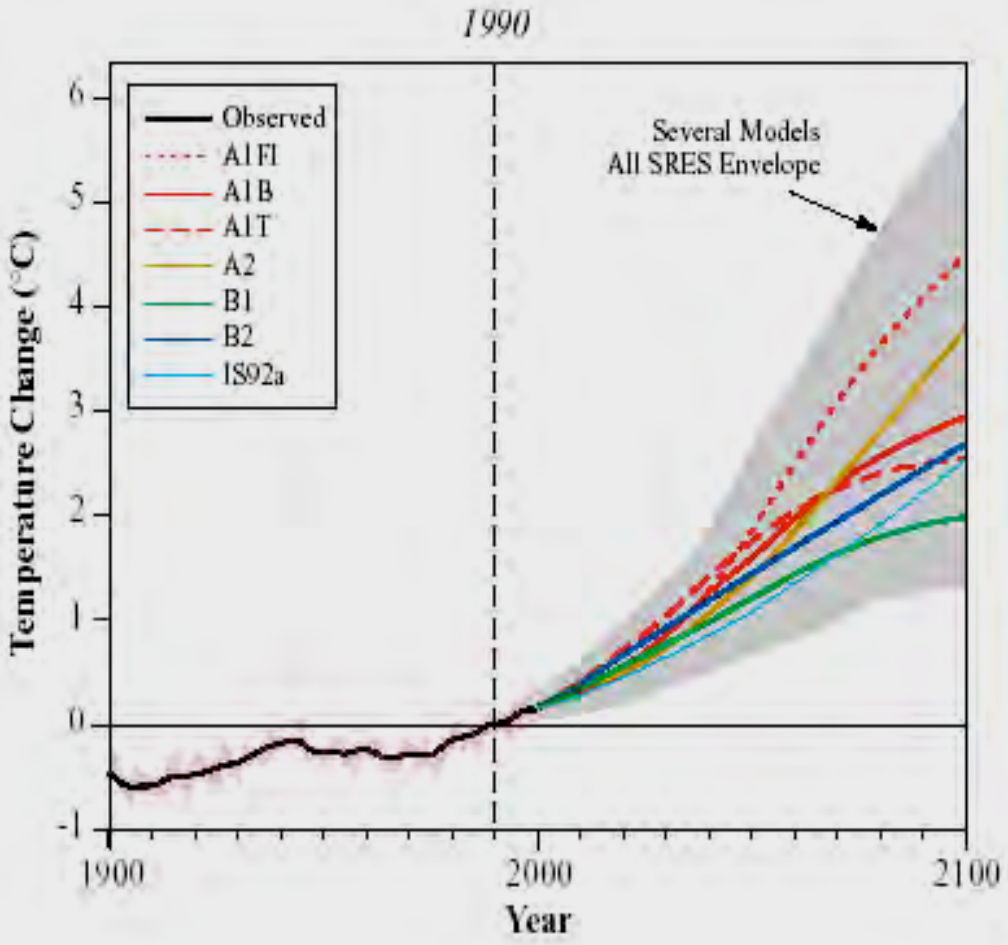
Watt-Cloutier, in Oslo to receive an environmental prize, said the inuits' planned petition to the 34-member Organization of American States (OAS) could put pressure on the United States to do more to cut industrial emissions of heat-trapping gases.

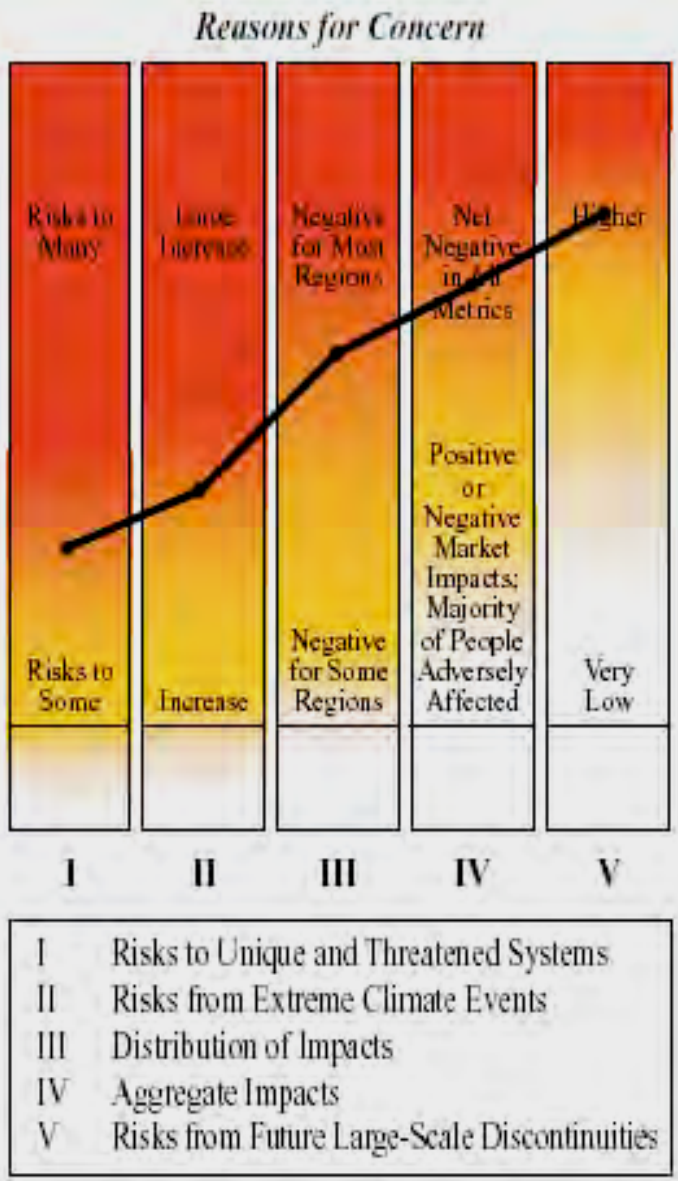
"It's still in the works, the drafting is still going on," she said of a long-planned petition to the OAS' human rights arm, the Inter-American Commission on Human Rights.

“Traceable account” (Moss-Schneider, 2000) of aggregation process:

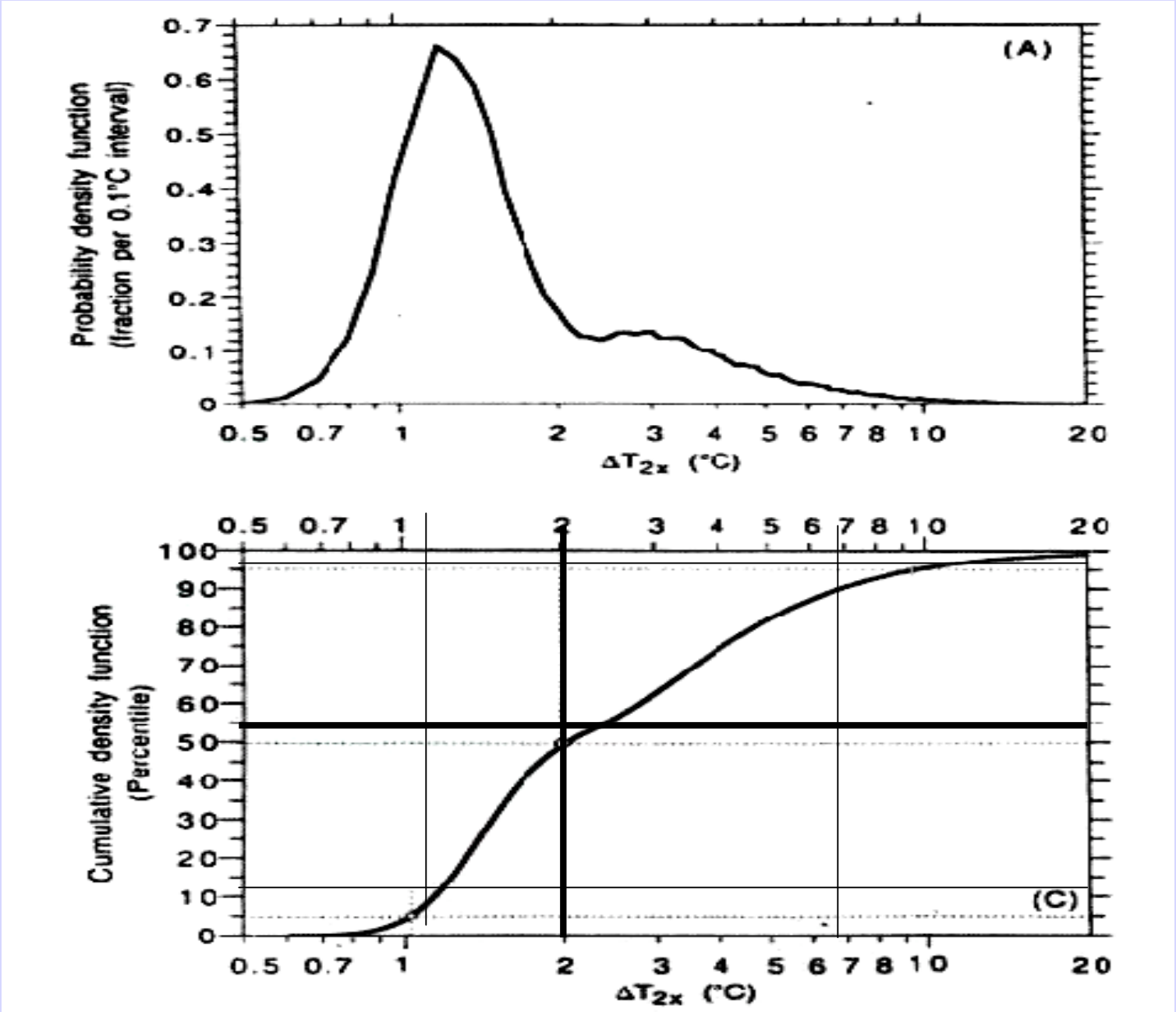
Each “Reason for Concern” independent and equally important (no differential weights), and degrees of “dangerousness” accumulate across the five dimensions. Other aggregations/weighting needed, and should be important goals of impacts research in the context of Article 2

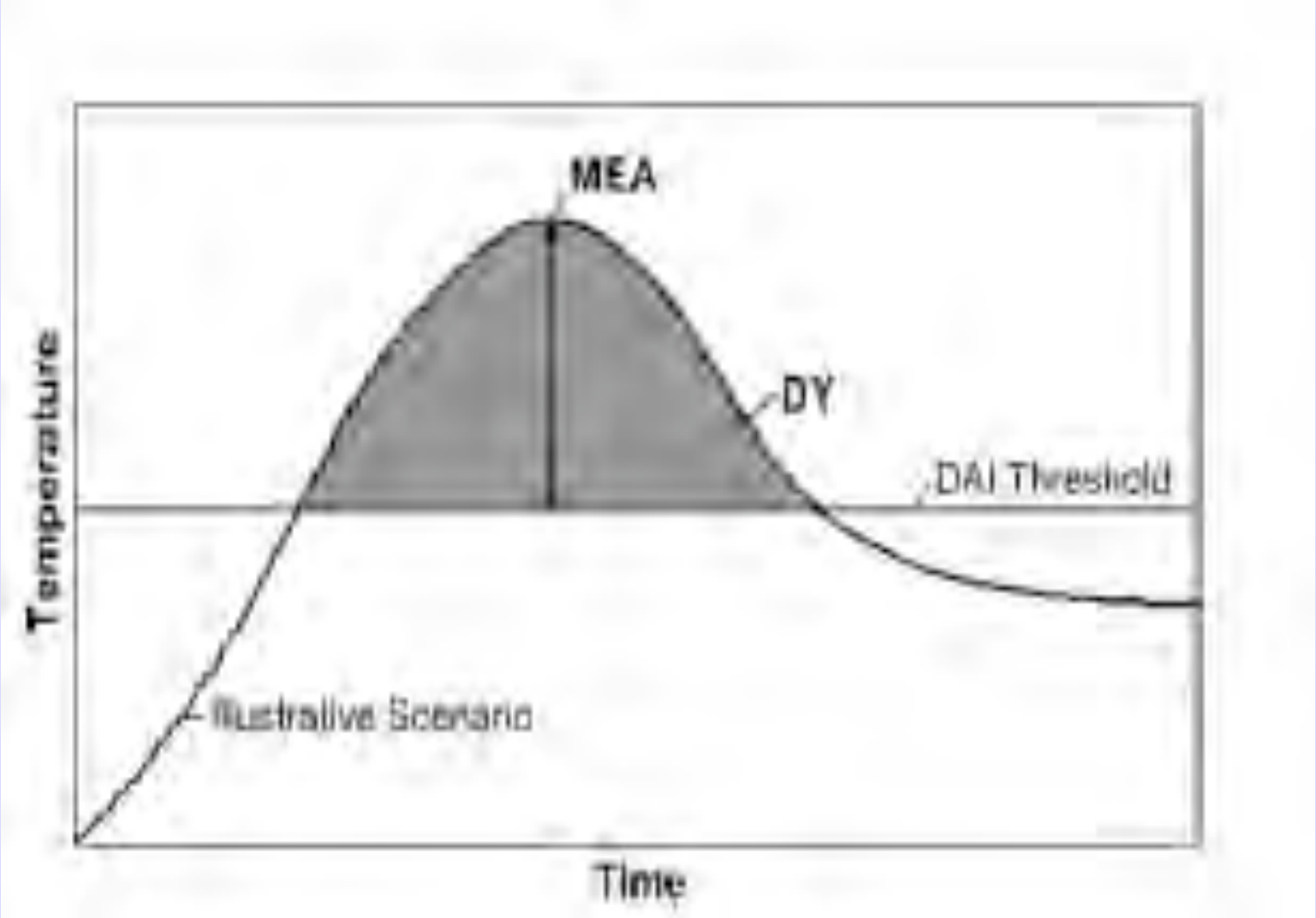
Reasons for Concern About Climate Change Impacts.



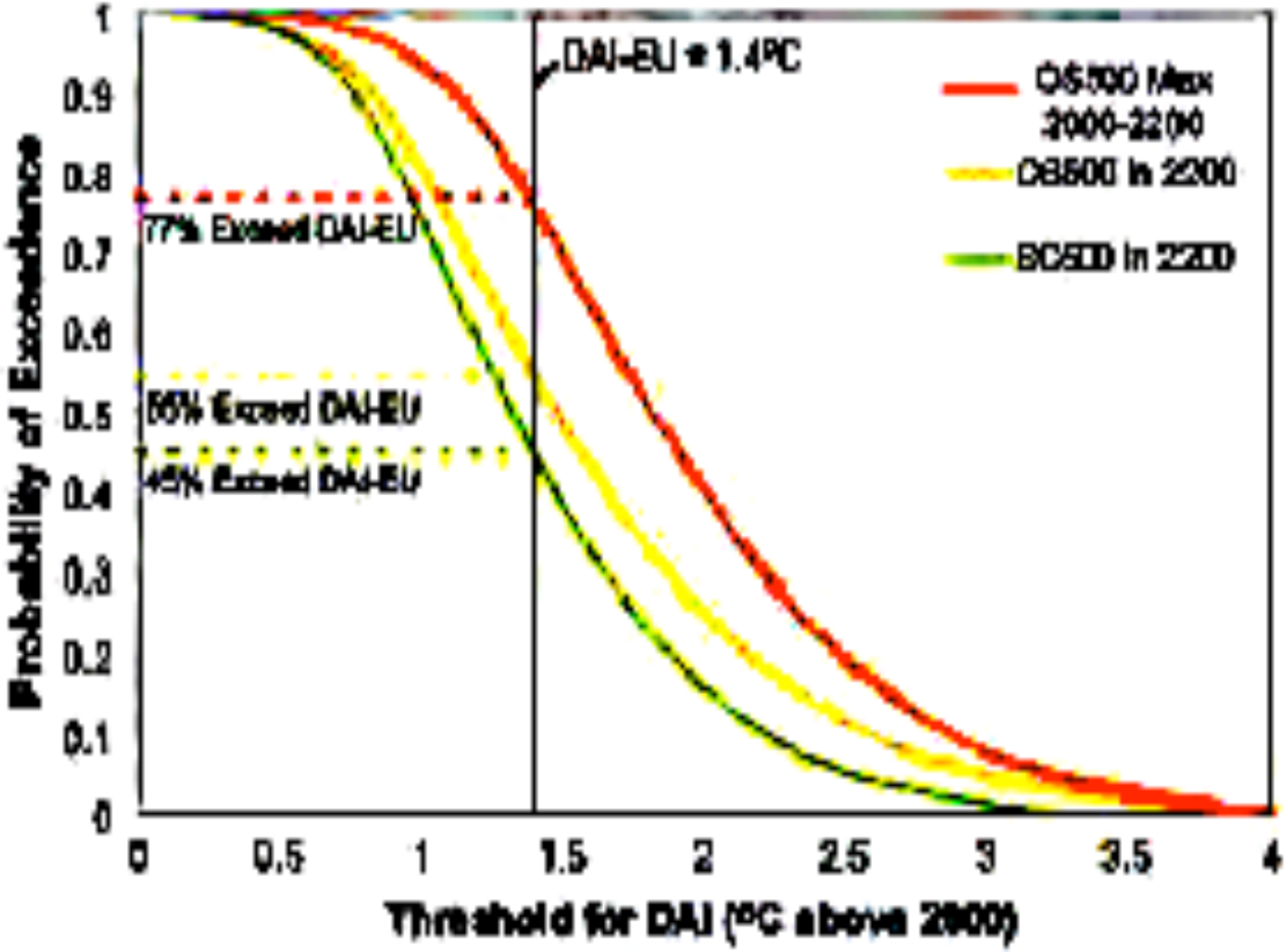


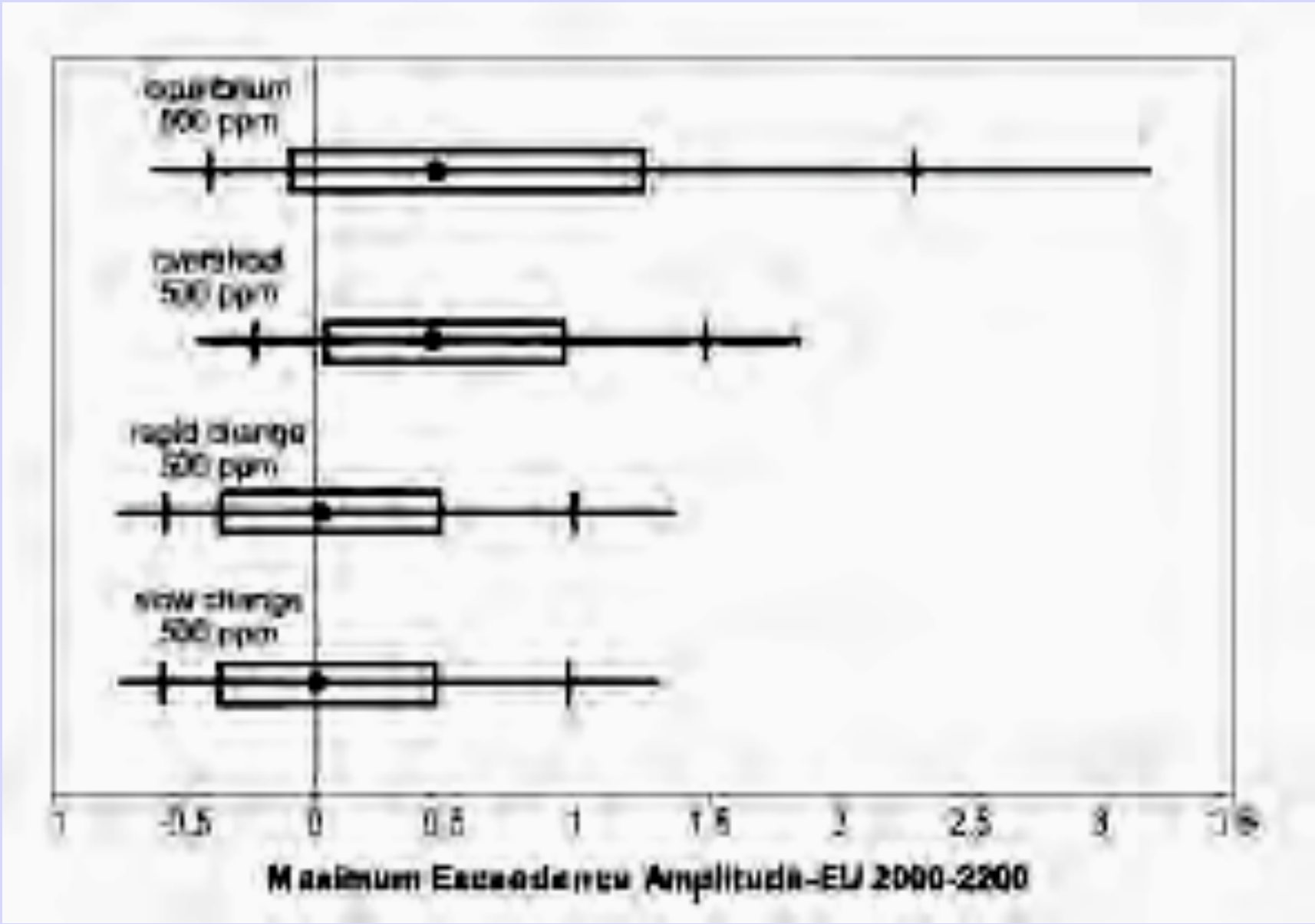
I	Risks to Unique and Threatened Systems
II	Risks from Extreme Climate Events
III	Distribution of Impacts
IV	Aggregate Impacts
V	Risks from Future Large-Scale Discontinuities

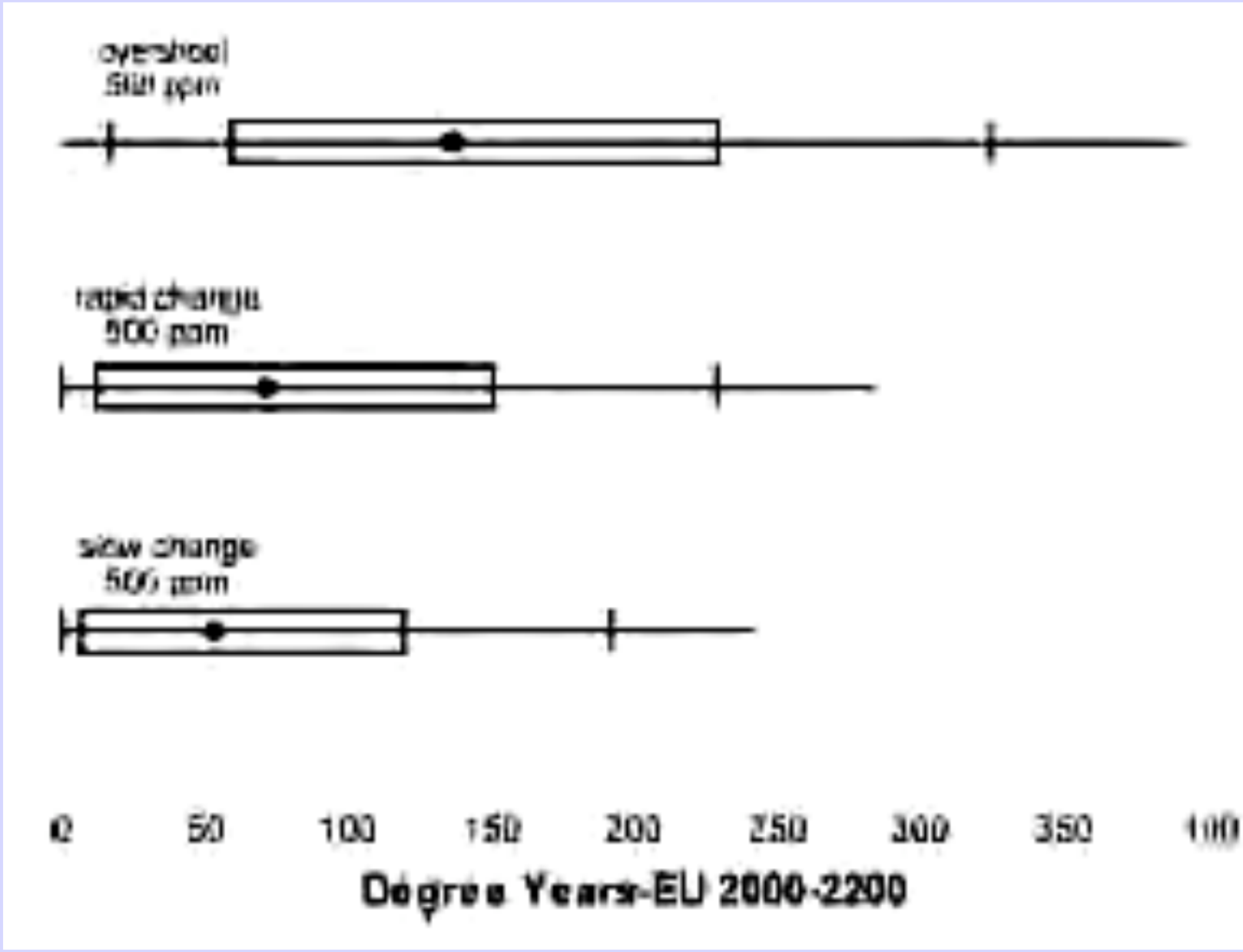

(A)
Probability density function
(fraction per 0.1°C interval)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.5 0.7 1 2 3 4 5 6 7 8 10 20
ΔT2x (°C)
0.5 0.7 1 2 3 4 5 6 7 8 10 20
100
90
80
70
60
50
40
30
20
10
0
Cumulative density function
(Percentile)
(C)
0.5 0.7 1 2 3 4 5 6 7 8 10 20
ΔT2x (°C)

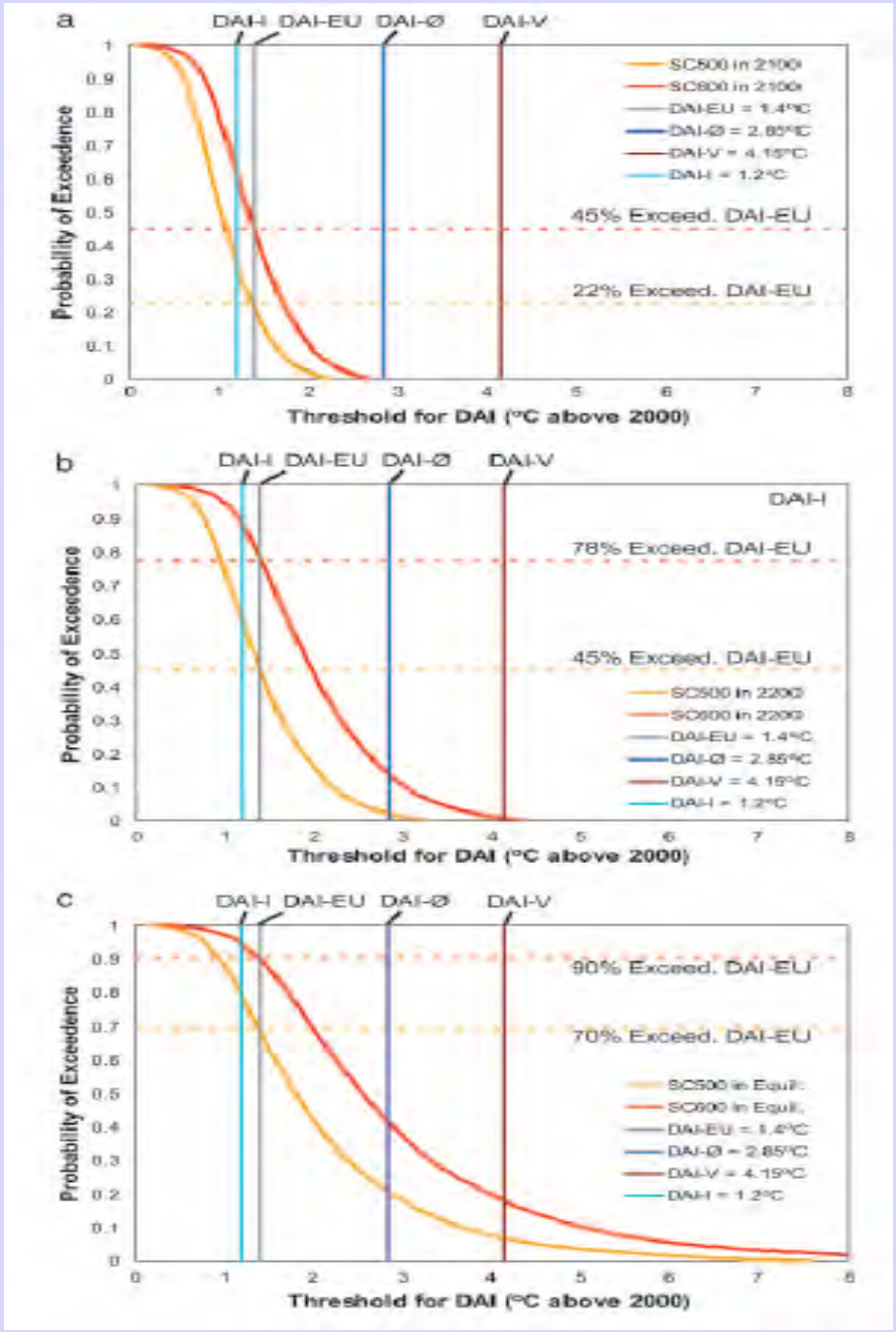


Source: Schneider and Mastrandrea, PNAS, 2005


DAI-EU = 1.4°C
77% Exceed DAI-EU
55% Exceed DAI-EU
45% Exceed DAI-EU
Probability of Exceedance
Threshold for DAI (°C above 2600)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
0.5
1
1.5
2
2.5
3
3.5
4


equilibrium
600 ppm
overshoot
500 ppm
rapid change
500 ppm
slow change
500 ppm
-0.5
0
0.5
1
1.5
2
2.5
3
Maximum Exceedance Amplitude-EU 2000-2200


overshoot
550 ppm
rapid change
500 ppm
slow change
500 ppm
0
50
100
150
200
250
300
350
400
Degree Years-EU 2000-2200


a
DAI-I
DAI-EU
DAI-Ø
DAI-V
Probability of Exceedence
SC500 in 2100
SC600 in 2100
DAI-EU = 1.4°C
DAI-Ø = 2.85°C
DAI-V = 4.15°C
DAI-I = 1.2°C
45% Exceed. DAI-EU
22% Exceed. DAI-EU
Threshold for DAI (°C above 2000)
b
DAI-I
DAI-EU
DAI-Ø
DAI-V
DAI-I
78% Exceed. DAI-EU
45% Exceed. DAI-EU
SC500 in 2200
SC600 in 2200
DAI-EU = 1.4°C
DAI-Ø = 2.85°C
DAI-V = 4.15°C
DAI-I = 1.2°C
Probability of Exceedence
Threshold for DAI (°C above 2000)
c
DAI-I
DAI-EU
DAI-Ø
DAI-V
90% Exceed. DAI-EU
70% Exceed. DAI-EU
SC500 in Equil.
SC600 in Equil.
DAI-EU = 1.4°C
DAI-Ø = 2.85°C
DAI-V = 4.15°C
DAI-I = 1.2°C
Probability of Exceedence
Threshold for DAI (°C above 2000)

Keetch-Byram Drought Index as a measure of forest fire

- The drought index is defined as, “a number representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency in deep duff or upper soil layers” (Keetch and Byram, 1968)

- The values of KBDI range from 0-800, with 800 indicating extreme drought and 0 indicating saturated soil.

- High values of the KBDI are an indication that conditions are favorable for the occurrence and spread of wildfires because more fuel is available for combustion (i.e. fuels have a lower moisture content)

Relation of KBDI to fire behavior

- **0 - 200** : Soil and fuel moisture are high and do not contribute significantly to fire intensity
- **200-400**: Lower litter and duff layers start drying and beginning to contribute to fire intensity. Fires burn more readily
- **400 - 600** : Very intense fires. The intensity can be expected to increase at an almost exponential rate from the lower to the upper end of this range.
- **600 - 800** : This represents most severe drought conditions resulting from an extended period of little or no precipitation and high day time temperatures. The index is associated with severe drought, increased wildfire occurrence, intense and deep burning fires.

Ref:- Keetch and Byram, 1968; Melton, M., 1996.

HADCM3 and PCM projections

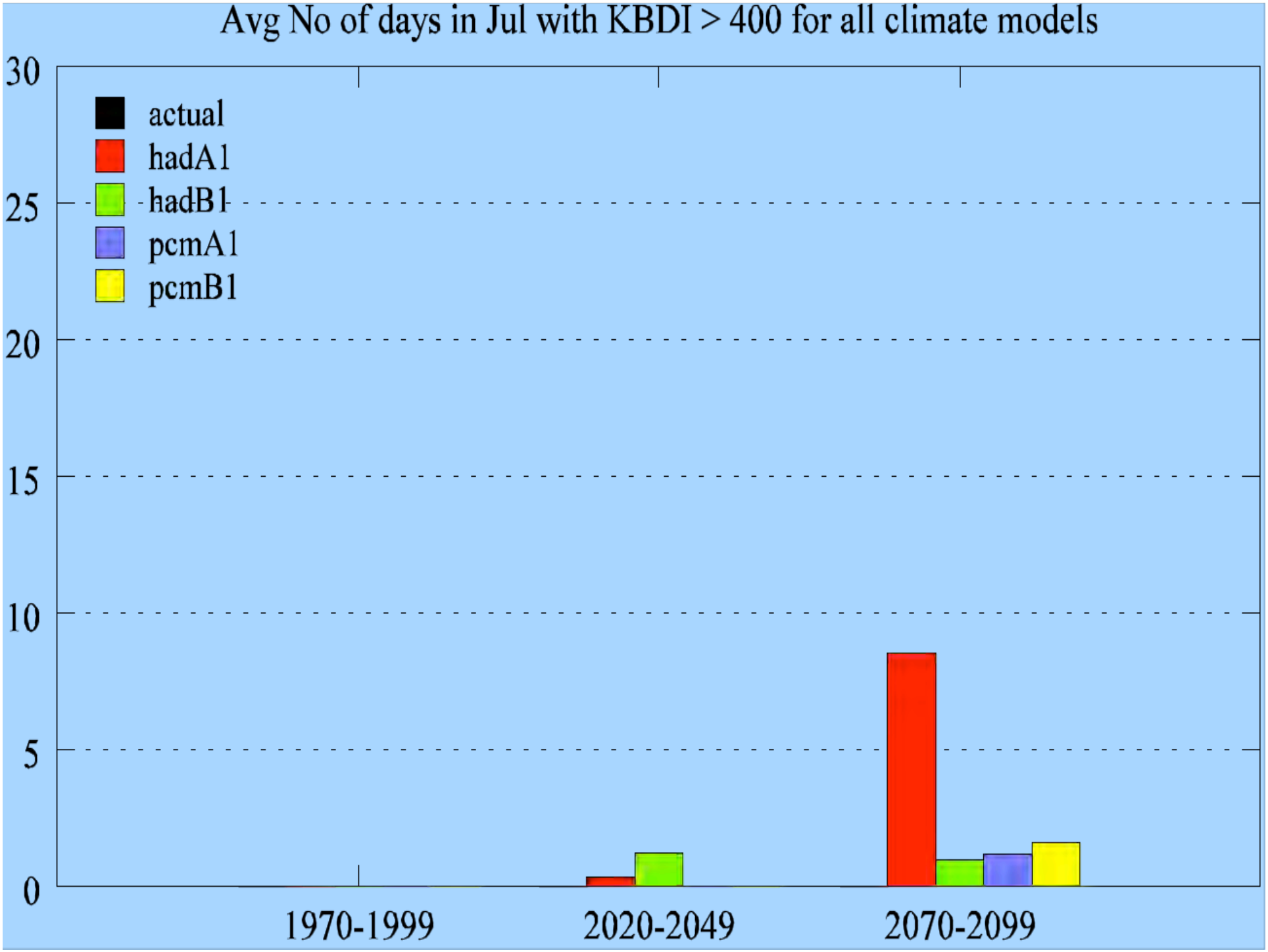
- The analysis is based on climate projections for the lowest (B1≈ 550 ppm of CO2) and highest (A1fi ≈ 970 ppm of CO2) Intergovernmental Panel on Climate Change (IPCC) emission pathways

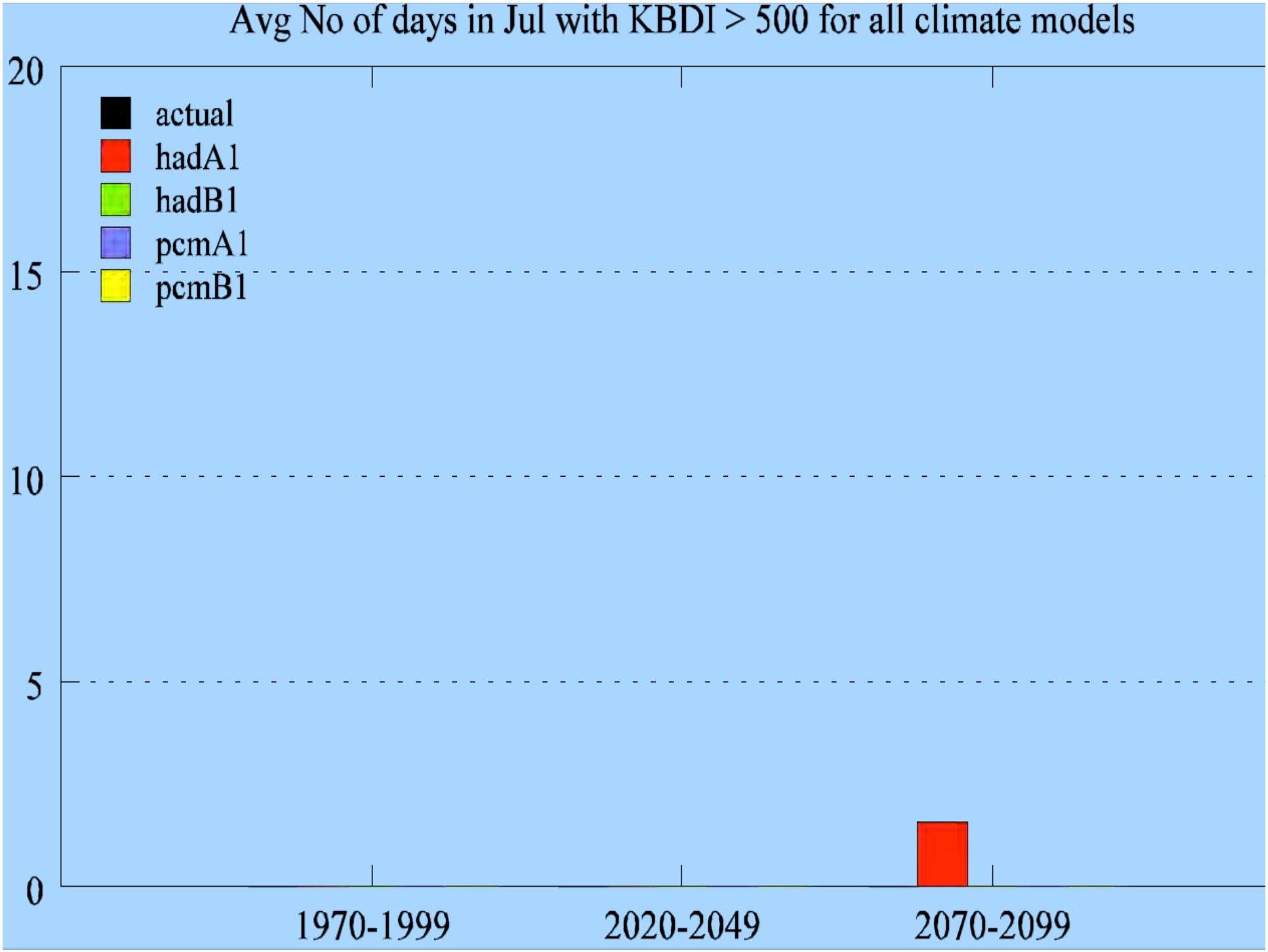
- Two global limate models, PCM and HadCM3 were used to project monthly tecmperature and precipitation data after bias correction and statistical downscaling to a 1/8 degree grid (Hayhoe et al, 2004).

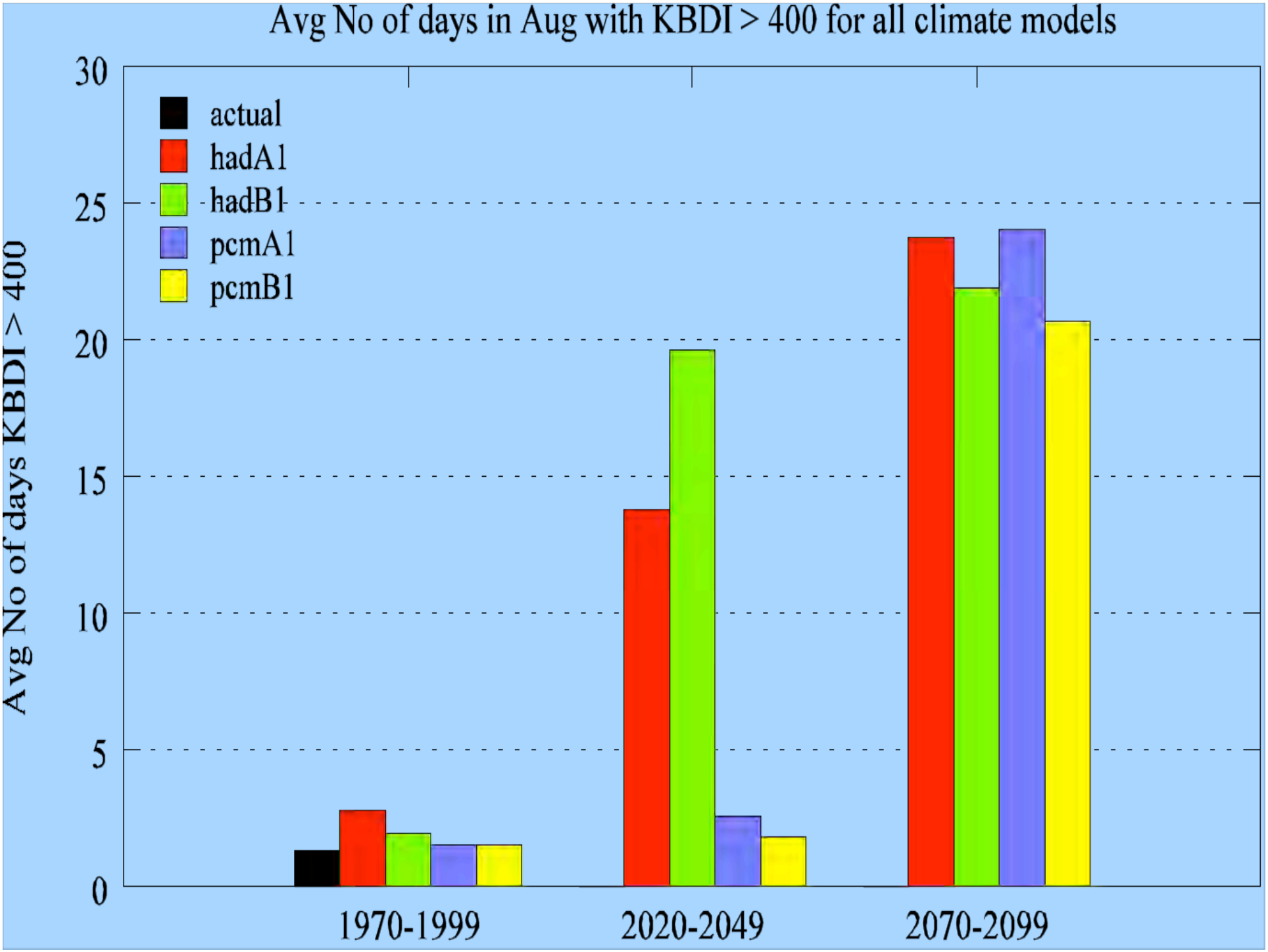
- The bias corrected and downscaled monthly data was further downscaled to daily data by randomly re- sampling from the historical record.

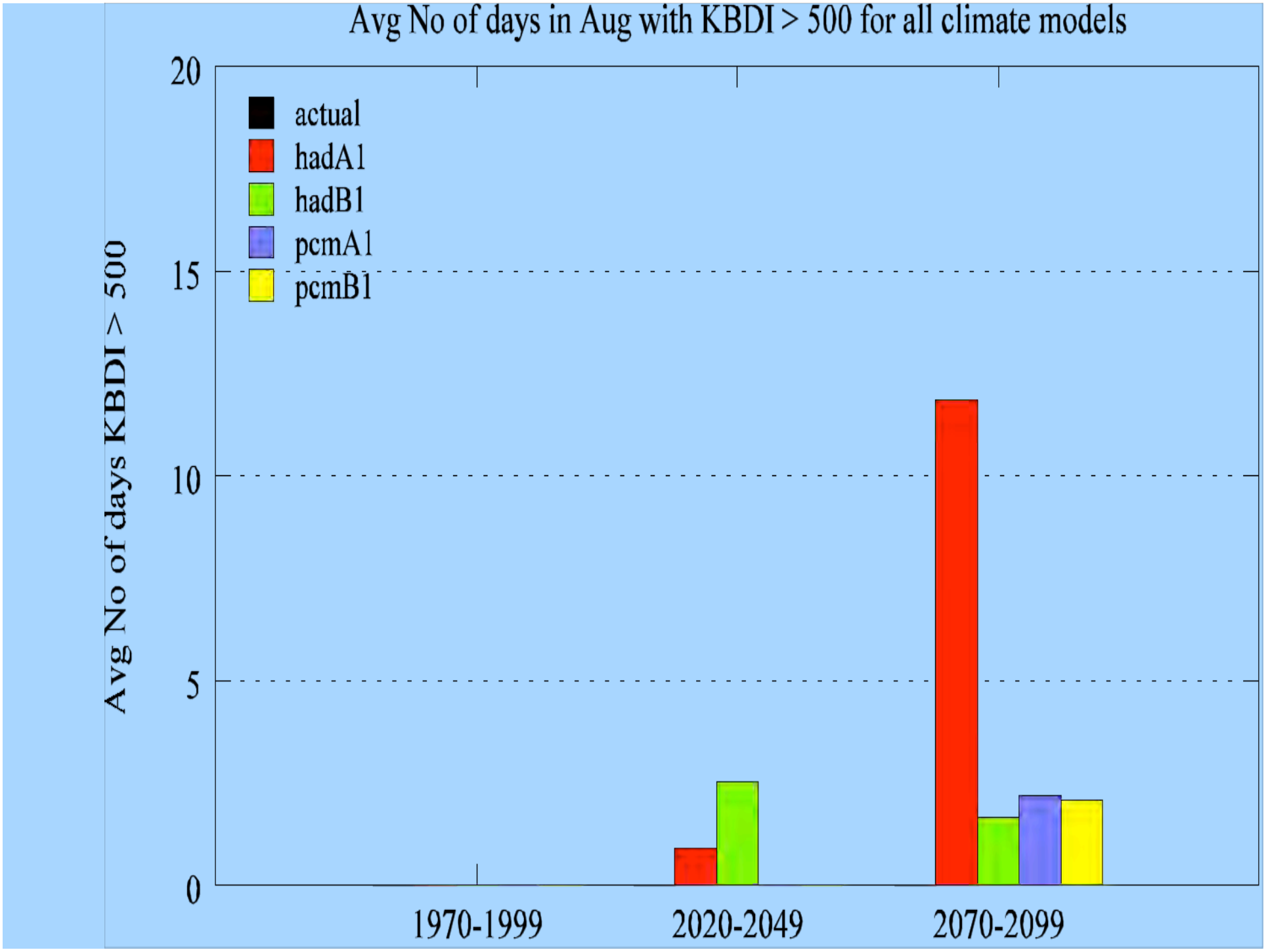
(Source: Edwin Maurer, Santa Clara University

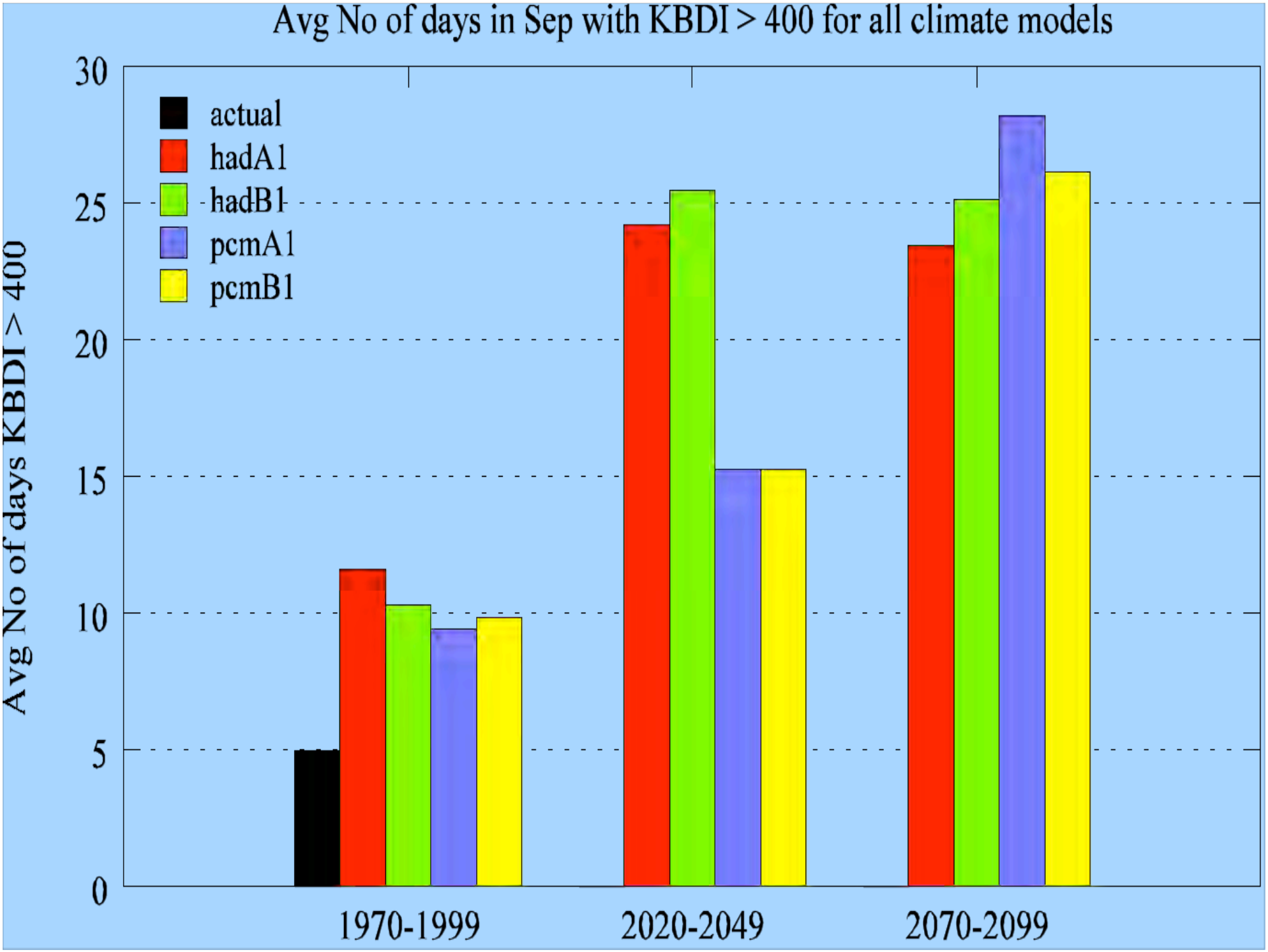
http://www.engr.scu.edu/~emaurer/data.shtml

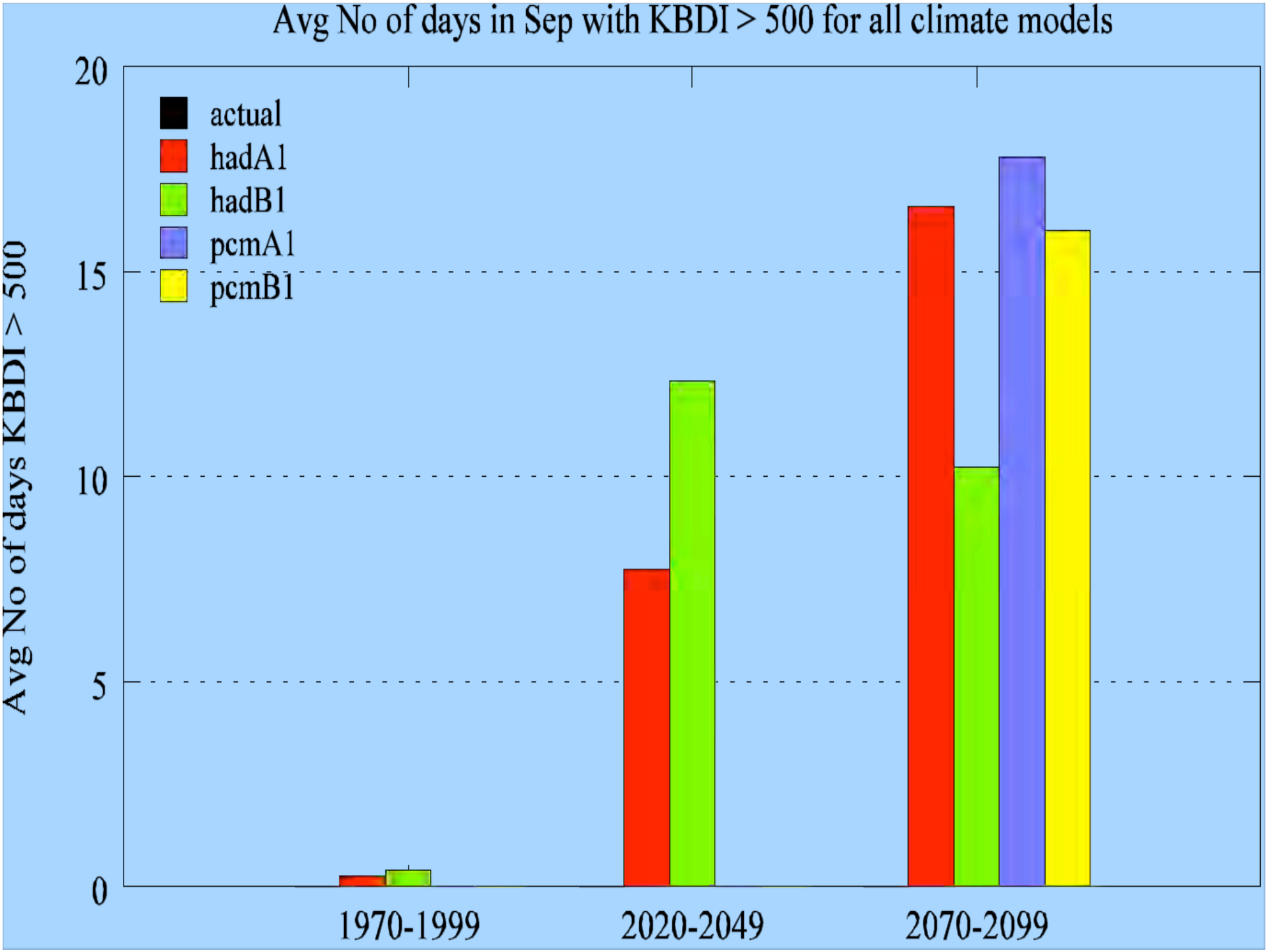

Avg No of days in Jul with KBDI > 400 for all climate models
30
25
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099

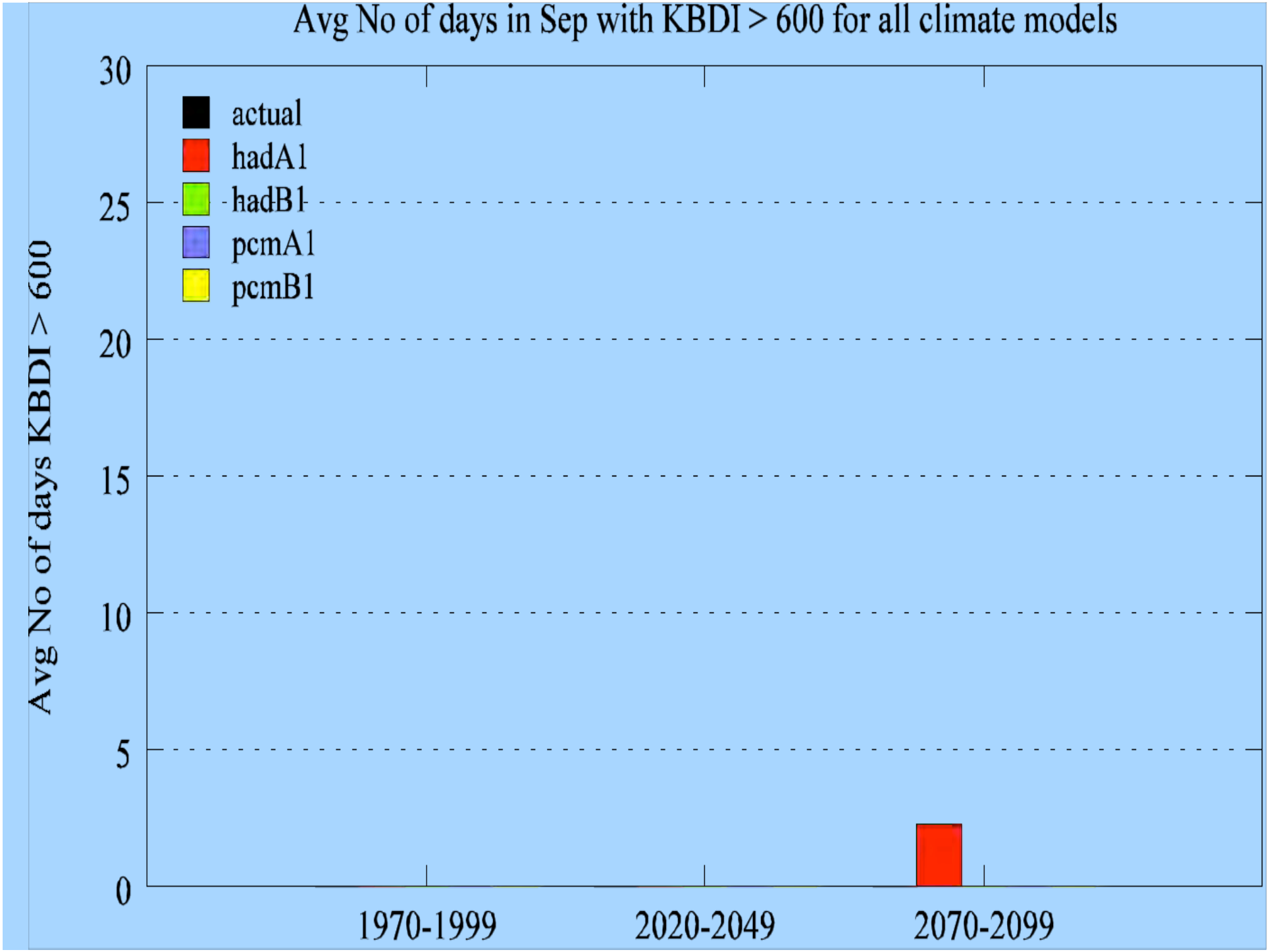

Avg No of days in Jul with KBDI > 500 for all climate models
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099


Avg No of days in Aug with KBDI > 400 for all climate models
Avg No of days KBDI > 400
30
25
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099


Avg No of days in Aug with KBDI > 500 for all climate models
Avg No of days KBDI > 500
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099


Avg No of days in Sep with KBDI > 400 for all climate models
Avg No of days KBDI > 400
30
25
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099

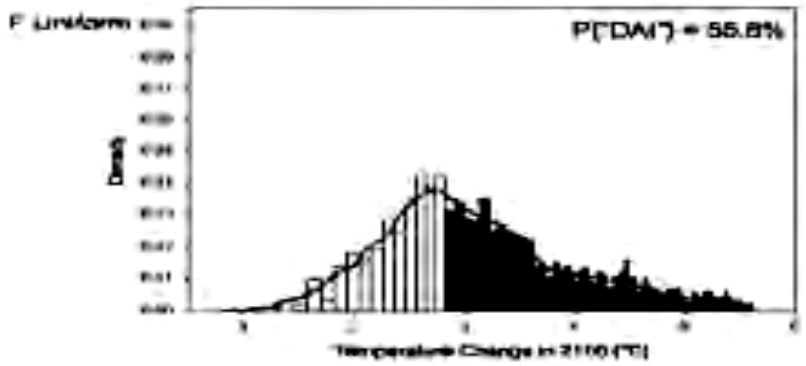

Avg No of days in Sep with KBDI > 500 for all climate models
Avg No of days KBDI > 500
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099

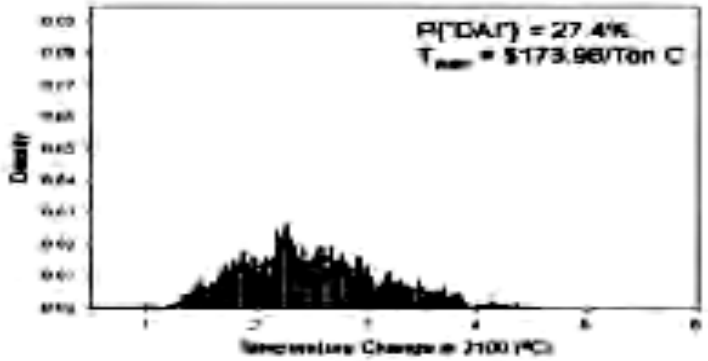

Avg No of days in Sep with KBDI > 600 for all climate models
Avg No of days KBDI > 600
30
25
20
15
10
5
0
actual
hadA1
hadB1
pcmA1
pcmB1
1970-1999
2020-2049
2070-2099

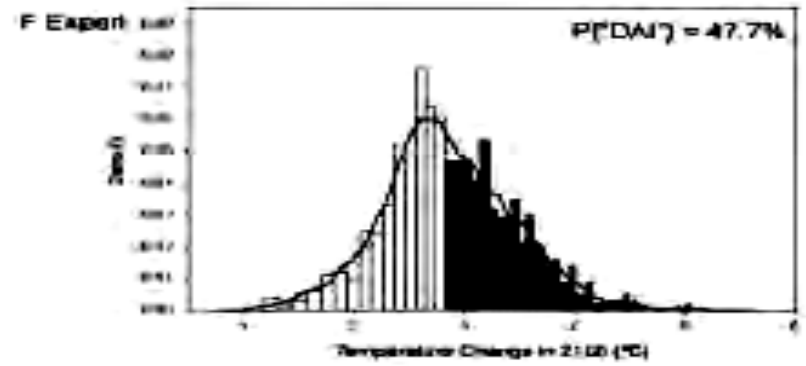
QUESTIONS AND COMMENTS PLEASE

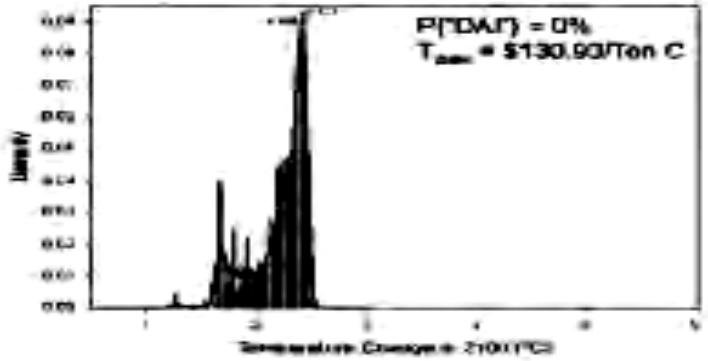
a) Single Monte Carlo

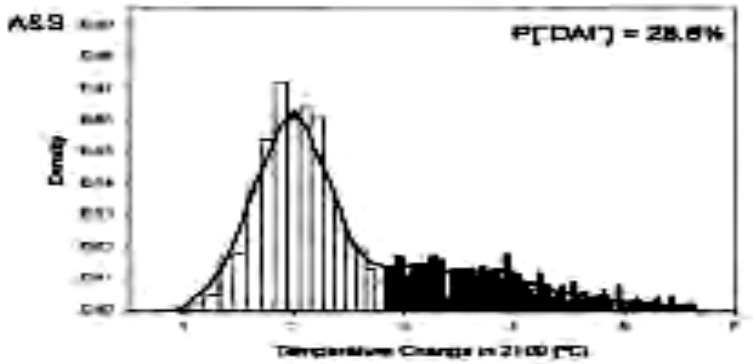
b) Joint Monte Carlo

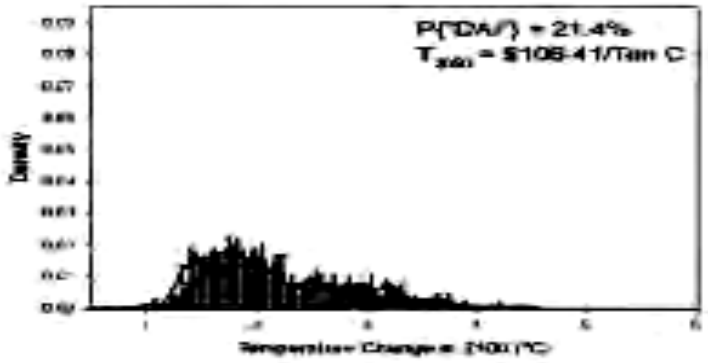


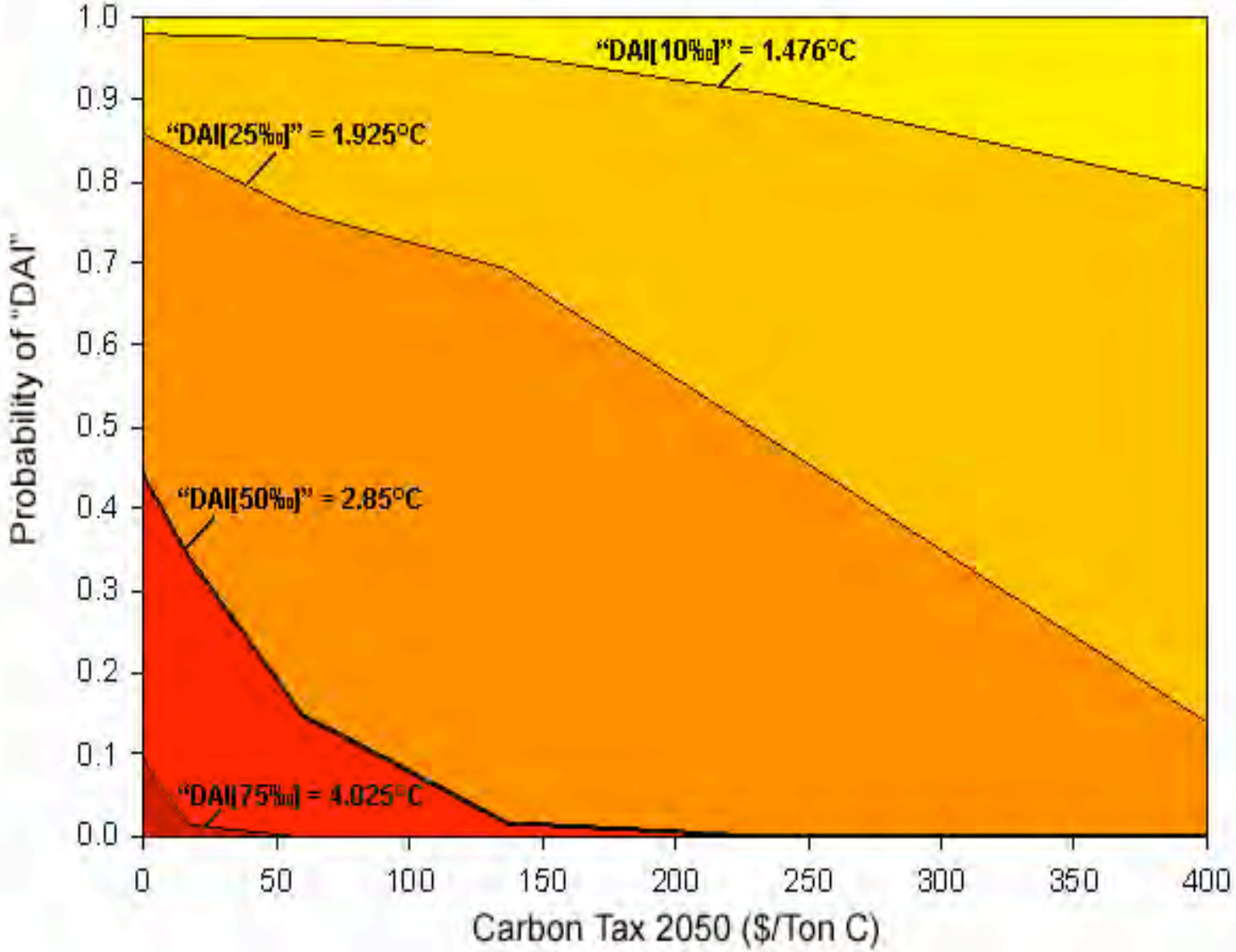


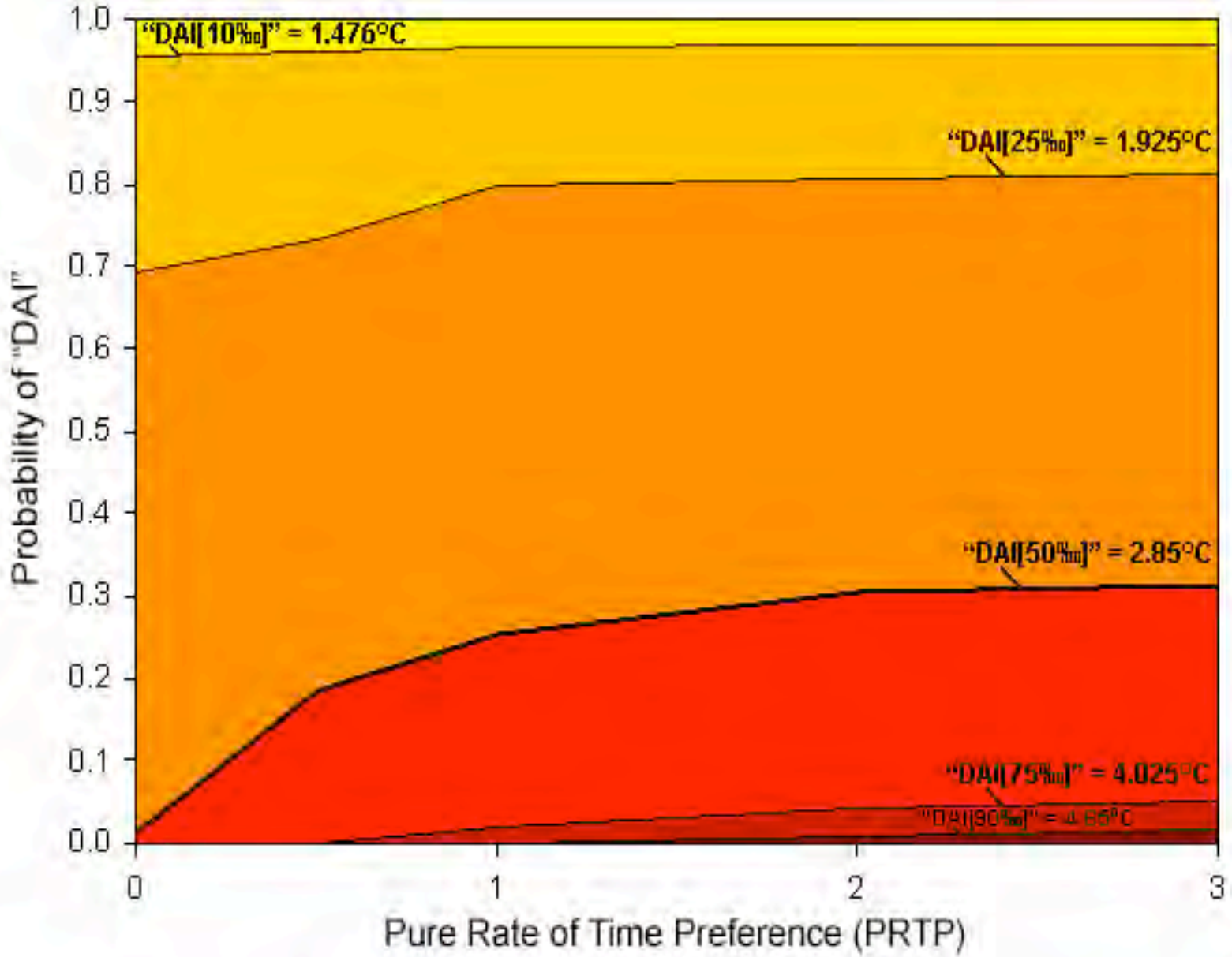









"DAI[10‰]" = 1.476°C
"DAI[25‰]" = 1.925°C
"DAI[50‰]" = 2.85°C
"DAI[75‰]" = 4.025°C
Probability of "DAI"
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
50
100
150
200
250
300
350
400
Carbon Tax 2050 ($/Ton C)


"DAI[10‰]" = 1.476°C
"DAI[25‰]" = 1.925°C
"DAI[50‰]" = 2.85°C
"DAI[75‰]" = 4.025°C
"DAI[90‰]" = 4.85°C
Probability of "DAI"
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
1
2
3
Pure Rate of Time Preference (PRTP)

WHAT ARE THE FUTURE IMPLICATIONS OF POPULATION, AFFFLUENCE AND TECHNOLOGY GROWTH PROJECTIONS?

****

HOW CAN THE FUTURE BE SCIENTIFICALLY ANALYSED?

NOSTRADAMUS PREDICTS HOTTEST SUMMER IN HISTORY

FAMOUS seer Nostradamus wrote a clear and specific poem that reveals the horrors of our upcoming weather.

uly, August and September. Dr. Heubner provides anslations and interpretaons of the references below:

● A blast furnace-like eat wave scorches the outheast in July, with daytime temperatures running s high as 112 to 119 de-

tricity causes power blackouts that paralyze commerce and touch off riots and widespread looting.

● The Northeast reels under blistering heat and humidity in the latter half of August and September. Dry, stagnant air contributes to

phalt highways to goo, stranding motorists who find their cars sinking into the road bed.

● Heavy rains and flooding plague the Midwest in late July and early August. A record "crop" of mosquitos spreads torment and disease even as the rains stop

heat push people over the edge.

● The West Coast reels under a drought that begins later this month and continues through September — at least.

Temperatures reach 110 degrees six times in August alone. Vicious electrical

ing hundreds of children, senior citizens and people with respiratory disease.

● The Southwest takes the brunt of the heat wave as sustained temperatures of 120-plus — with sporadic highs of 135-plus — cause severe water shortages in populated areas and wipe